

# THE AMERICAN NEPTUNE

A QUARTERLY JOURNAL OF MARITIME HISTORY



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# THE AMERICAN NEPTUNE

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ON 20 April we lost another of the original group of men who met at Walter Whitehill's barn in North Andover to found THE AMERICAN NEPTUNE in 1940. Lawrence Waters Jenkins was at that time Director of the Peabody Museum of Salem, and a friend of many of our subscribers. He had been associated with the Museum since 1900, when he came as a volunteer, first working on the staff as an ethnologist and Curator of the Ethnology Department. Later, upon the death of John Robinson, he became Curator of the Marine Room, a position which he held until 1949. He retired as Director in 1950, and continued as Director Emeritus until his death at the age of eighty-eight. As a Curator and Director of the Peabody Museum of Salem, he was a great collector. The substantial holdings of the institution in the field of maritime history owe much to his knowledge and enthusiasm. He was adept at locating material, particularly broadsides, log books, journals, and shipping papers which otherwise might have ended in a village dump, and steering them into our library. He was also proficient in persuading people to present paintings, models, scrimshaw work, portraits, and all else which might fit into the Museum's collections. From 1943 through 1948 he served as Treasurer of THE AMERICAN NEPTUNE.

*Over the last Memorial Day week end I drove down the Maine coast as far as the eastern shore of Union River bay. It was a lovely, windy, blue spring day. The soft foliage was brightened by the filmy white blossoms of wild pear, and rhodora gave color among the gray boulders of pasture hillsides and along the woodland edges. But is was sad to see the lack of maritime activity along the coast, even though the season was early. Two new ships for the Navy were tied up at the Bath Iron Works and another was on the ways. The poor old Hesper and Luther Little at Wiscasset continue their slow disintegration, their remaining masts tilting crazily as they settle into the ooze. There were a few commercial fishing boats at Rockland, two more with a couple of tugs at Belfast, and a few lobster boats here and there. A freighter was tied up at the pier in Searsport and one of the dude coasters was being overhauled in Damariscotta. But aside from this, whenever the ocean came into view it stretched an empty and uninterrupted blue, broken only by green islands and headlands.*

*I thought back to a similar journey in the fall of 1926 and remembered that there was always at least one coaster in sight whenever we saw the ocean. The steamboat landings were still hives of activity for that pleasant way of travel was still appreciated. In Portland harbor several multimasted schooners were at anchor, but the end was near for them all. How near none of us knew at the time, for they were sights that were taken for granted and that long years of association had made familiar. In another month the coast will be busy again with yachting for the summer, and we shall be grateful that those who sail for pleasure carry on some of the traditions of the sea even though the coastal waters are no longer the necessary highways to the villages that they once were.*

ERNEST S. DODGE

Peabody Museum of Salem



## *The Geography of the Balsa\**

BY J. G. NELSON

### *Introduction*

THE Balsa is perhaps the most mysterious and controversial of primitive watercraft. Even the origin of the name is obscure. Some say it is Greek, others Basque or Caribbean in derivation.<sup>1</sup> Of much greater importance is the uncertainty as to its meaning. Balsa has been used as an all-inclusive designation for floats of every kind and description in the Americas. It has been applied not only to all types of native floats, constructed of everything from reeds<sup>2</sup> and gourds to logs, but even to craft improvised by Europeans.<sup>3</sup> Recently, however, Heyerdahl<sup>4</sup> and others<sup>5</sup> have tended to limit it to various log rafts built of the light buoyant wood common along the western coast of South America.

It is these log balsas which are the focus of interest in this paper. They were in common use along the shores of contemporary Peru and Ecuador at the time of the Spanish Conquest and are known to have played a prominent role in the maritime activities of this region for many hundreds of years.<sup>6</sup> For decades scholars have pondered the problem of their origin with very diverse results. Some have linked them with various Old World rafts,<sup>7</sup> as in Formosa or Southeastern Asia<sup>8</sup> and have suggested

\*This paper constitutes the major part of a Ph.D. dissertation completed at Johns Hopkins University in June 1959. To Drs. G. F. Carter, M. G. Wolman, N. Fast, and to Arthur Everhart and my wife I owe special thanks for much help and criticism during the period of its preparation.

<sup>1</sup> G. Friederici, *Die Schifffahrt der Indianer* (Stuttgart, 1907), p. 16.

<sup>2</sup> H. H. Brindley, 'The Sailing Balsa of Lake Titicaca and Other Reed-Bundle Craft,' *The Mariner's Mirror*, XIX (1931), 7-19.

<sup>3</sup> Friederici, *op. cit.*, p. 10.

<sup>4</sup> See for example T. Heyerdahl, *American Indians in the Pacific* (London, 1952).

<sup>5</sup> E. Estrada, 'Balsa and Dugout Navigation in Ecuador,' *THE AMERICAN NEPTUNE*, XV (1955), 142-149.

<sup>6</sup> See T. Heyerdahl, 'The Balsa Raft in Aboriginal Navigation off Peru and Ecuador,' *Southwestern Journal of Anthropology*, XI (1955), 251-264; or S. K. Lothrop, 'Aboriginal Navigation off the West Coast of South America,' *Journal of the Royal Anthropological Institute*, LXII (1932), 229-256.

<sup>7</sup> S. Nishimura, *Ancient Rafts of Japan* (Tokyo, 1925), p. 86.

<sup>8</sup> R. Heine-Geldern, 'Die Asiatische Herkunft der Sud Amerikanischen Metalltechnik,' *Paiduma*, V (1954), 408.

that they spread to the New World either across the islands and waters of the Pacific,<sup>9</sup> or around the long northern route via the Bering Straits.<sup>10</sup> Others have postulated an Oceanic origin;<sup>11</sup> or implied that they were independently invented in South America<sup>12</sup> and subsequently carried to the islands of the eastern Pacific.<sup>13</sup>

Study shows that these opinions not uncommonly have been advanced without careful comparison of the form of the rafts involved. Thus, the use of similar accessories, such as centerboards and sails, has been accepted as evidence that rafts in different areas are genetically related. In fact, however, these may be used on raft hulls representing entirely different lines of development. This study is an attempt to clarify the problem of the origin of the Peruvian log balsa by defining the hull or main body of the raft as rigidly as possible before attempting to correlate it with seemingly similar rafts of other areas of the World.

#### *The Classification of the South American Log Balsas*

Only one student, Emilio Estrada of Ecuador, has attempted anything approaching a systematic classification of the log balsas of South America. Using a combination of criteria, chiefly use, size, and form he distinguished three types.

The first he labelled 'the large freighter raft.' Its relevant characteristics are summarized in the following list:

- (1) The hull contained twenty to thirty logs.
- (2) These logs were arranged in cribwork fashion about a hollow, central cargo chamber.
- (3) The logs were piled high (perhaps more than ten feet) so that some of the layers sank two or three feet within the surface of the water. The logs were pinned as well as lashed together.
- (4) The raft seems to have been square or rectangular, without a shaped or streamlined prow.

This craft carried a sail and usually seems to have been guided by a large steering oar rather than centerboards, probably because the number of tiers employed would make it difficult to place the *quaras* far enough below the craft to be effective. One important result of center-

<sup>9</sup> Nishimura, op. cit., p. 86.

<sup>10</sup> J. Hornell, 'South American Balsas: the Problem of their Origin,' *The Mariner's Mirror*, XVII (1931), 346-355.

<sup>11</sup> R. L. Bowen, 'Eastern Sail Affinities,' *THE AMERICAN NEPTUNE*, XIII (1953), Pt. I, 108.

<sup>12</sup> Heyerdahl, *American Indians in the Pacific* (1952), p. 593.

<sup>13</sup> See for example T. Heyerdahl, 'The Voyage of the Raft Kon-Tiki,' *The Geographical Journal*, CXV (1950), 20-41.

board absence was apparent inability to sail against the wind. A fire often served 'to dress the victuals' of the crew during the lengthy sea voyages (often as far as Panama) characteristically undertaken in the raft.<sup>14</sup>

Estrada stated that the large freighter is known only through the descriptions of Dampier, a voyager along the South American coast in 1684. But a comparable type may have been observed before as well as after this date. In 1527 Ruiz, Pizarro's pilot and the first European known to have traveled the coast of Peru, intercepted a raft proceeding in a northerly direction, perhaps towards Panama. This

... carried twenty persons on board, of them they threw eleven overboard. ... This vessel which I say he captured appeared to have a capacity of up to thirty toneles [36 gross tons]. The flat underbody and keel were constructed of poles as thick as posts, lashed together with ropes of what they called hennequen, which is a kind of hemp. The upper part was of more slender canes, tied together with the same lashings, and there the crew and cargo went dry while the bottom was awash. It carried masts and yards of very fine wood, and cotton sails in the same shape and manner as on our own ships. It had very good rigging of the sail hennequen, which is like hemp, and some mooring stones for anchors formed like quidstones.<sup>15</sup>

This hull may have been tiered, although perhaps not to the same extent as the Dampier model. The number of passengers and size of the cargo suggest a raft of great capacity; and evidently neither a curved prow nor centerboards were used. These characteristics suggest the freighter-type raft.

Plate 9 shows rafts seen by Humboldt in 1810 and by Paris in 1840. These could be considered as the nineteenth-century counterparts of Estrada's large freighter. Humboldt portrays a raft of unusual beauty, characterized by a sail, A-mast, hut being loaded with cargo, a platform, garden, and fire. Although the hull is obscured, there do not seem to be too many tiers involved. The use of the centerboard supports this. In shape the craft is rectangular; the bow is neither curved nor sheered.

Paris' rafts lie athwart one another like a row of modern steamers. The first in line is clear. It possesses an A-mast and sail set forward somewhat more than those on Humboldt's. A well-constructed hut is set atop a platform, which appears to consist of several layers of crossed logs. However, the hull is again hard to see so that the number of tiers is unknown. But it, like the others, is not shaped. The bow is straight and flat.

There is evidence then to support the idea that the large freighter raft is pre-European on this coast and that it continued in use, relatively un-

<sup>14</sup> These points are derived for the most part from Estrada, op. cit., pp. 142-143.

<sup>15</sup> Heyerdahl, *American Indians in the Pacific* (1952), p. 517.



disturbed by contact, until late in the nineteenth century. This persistence probably is indicative of the usefulness of the craft and of its prominent place in the culture of the ancient Peruvians. It also suggests great age. Yet we have little direct evidence of the ancient use of this particular balsa. Archaeology has furnished some tiny model rafts from Arica in northern Chile, which Heyerdahl says were left there about one thousand years before European contact.<sup>16</sup> But these are not comparable in form to the large freighter and cannot be used to date it.

The second type of log raft more closely resembles the popular picture of the Peruvian balsa, perhaps because it served as the model for Heyerdahl's *Kon-tiki*. Estrada has called it the medium freighter. According to him, it had a hull of seven, nine or eleven logs and was steered by manipulation of centerboards. The latter numbered from three to as many as eighteen.<sup>17</sup>

This rather brief description can be expanded by analyzing the relatively complete discussions of the balsa in general, as published by Heyerdahl, Lothrop, and Means.<sup>18</sup> The medium type typically seems to have been constructed of an odd number of logs, five or more. These were lashed together to form a curved prow stepped somewhat like the fingers of the human hand. The center log was longest and projected fore and aft. In other respects the raft probably was variable. Thus Benzoni, a traveler in the New World about 1550, showed the stern cut straight across to the protruding center log (Plate 10 upper), whereas Spilbergen, a visitor about 1615, illustrated a stepped arrangement aft (Plate 10 lower).<sup>19</sup> Benzoni portrayed a hull sheered upwards at the bow, although neither Spilbergen, nor others such as the English naval historian Charnock, did so. Furthermore, Benzoni's raft was propelled by cross-handled paddles and a square sail hung on a roughly A-shaped mast. In contrast Spilbergen showed centerboards and two triangular sails.

The close to V-shaped prow, the long central log, and the odd-log arrangement are, therefore, the definitive elements in this raft. They differentiate it markedly from the large freighter.

On the other hand, these features correspond very closely with those exhibited by Estrada's third type of log balsa, the small balsilla. Estrada himself was of the opinion that the construction of this craft might have

<sup>16</sup> Heyerdahl, op. cit. (1955), p. 258.

<sup>17</sup> Estrada, op. cit., p. 143.

<sup>18</sup> P. A. Means, 'Pre-Spanish Navigation off the Andean Coast,' *THE AMERICAN NEPTUNE*, II (1942), 107-126.

<sup>19</sup> This discussion owes much to Heyerdahl's *American Indians in the Pacific*, a monumental compilation of the statements and illustrations made by the early chroniclers of Peru.

changed through the years. Nevertheless he offered Dampier's description as a type example.

If they are made for fishing, then they are only 3 or 4 Logs of light Wood, of 7 or 8 feet long, plac'd by the side of each other, pinn'd fast together with wooden pine, and bound hard with withes. The logs are so placed, that the middlemost are longer than those by the sides, especially at the head or fore part, which grows narrower gradually into an angle or point, the better to cut through the water.<sup>20</sup>

Such small rafts rarely have been mentioned in other sources and do not seem to have been used very much. The individual fishermen of Peru and Ecuador probably preferred reed craft in the past<sup>21</sup> as well as the present.<sup>22</sup> However, there is little doubt that the balsilla is ancient in this area. Benzoni's illustration (Plate 10 upper) depicts two of them in use early in the contact period. Recovery of toy replicas (Plate 11 upper) from graves at Arica, northern Chile, suggest that they were known to the earliest agriculturalists of that area<sup>23</sup> and that they can be considered as one thousand<sup>24</sup> if not thousands of years old.

The similarity in form between the balsilla and the medium balsa means that for the purposes of this study they can be treated as the same type of craft. The differences in size and use matter little; it is the design, or idea, of the Peruvian log balsa that we must try to explain. As a result only a twofold classification will be used here: the large freighter raft and the finger or organ-shaped raft. The rest of this study systematically traces the distribution of rafts similar to these two and discusses the possibility of their being genetically related to them.

### *The Large Freighter*

Asia is marked by a great diversity of primitive watercraft evidence of its fundamental role in the development of maritime arts and crafts.<sup>25</sup> Amid such nautical riches one might expect to find numerous references to rafts comparable to the Peruvian freighter. On the contrary they are rare.

Among the best known are the great cargo rafts of the Amur River (Plate 11 lower). Nishimura has described them as constructed in the nineteenth century.

<sup>20</sup> Estrada, op. cit., pp. 146-147.

<sup>21</sup> Heyerdahl, op. cit. (1955), p. 258.

<sup>22</sup> R. Fiedler, 'The Peruvian Fisheries,' *The Geographical Review*, XXXIV (1944), 103.

<sup>23</sup> J. Bird, 'The Cultural Sequence of the North Chilean Coast,' *Handbook of South American Indians*, ed. J. H. Steward (Washington: Smithsonian Bulletin 143, 1946), II, 588.

<sup>24</sup> Heyerdahl, op. cit. (1955), p. 258.

<sup>25</sup> J. Hornell, 'Primitive Types of Water Transport in Asia: Distribution and Origins,' *Journal of the Royal Asiatic Society* (1946), Pt. 3, pp. 124-141.

First of all, some timbers were laid side by side, then others crosswise on the first layer and lastly timbers are put crosswise on the second layer. Sufficient buoyancy is secured by the first layer, so that the raft can float without any other help; the second and third layers are for the sole purpose of preventing persons and cargoes from getting wet. The most common material for constructing raft-boats is so-called 'lanceolate leaf' wood.

The size of these rafts is not fixed, some measuring about 36 ft. in length and 18 ft. in breadth. In the middle of the raft-boat is built one roofed hut (sometimes two) in which raftsmen pass the night at each stop during their long navigation. They sometimes have as companions their pet dogs or barn-door fowls. A long steering-oar used in these rafts is very noteworthy in that it resembles that of the barges on other rivers in Siberia and South Russia.<sup>26</sup>

Nishimura has linked these with large rafts used on the Yalu, Yangtze, Lena, Ob, Tigris and other Asian streams. However, not all of these definitely are comparable to the freighter raft. Some possess characteristics sufficient to establish them as a separate raft type. The *Kellek* of the Tigris is an example. It resembles the rafts described previously in its square to rectangular outline and perhaps in its tiered hull. But it is distinctive in being buoyed up by skins set beneath the hull. For this reason, the *Kellek* is looked upon as being outside the Peruvian freighter class and not within the scope of this study.

Other rafts are very poorly described so that it is not certain that they are of the freighter line. Thus, the large Volga rafts are said by Nishimura to consist of

... a great number of logs on which many persons are carried and a big anchor is used.<sup>27</sup>

The Yangtze rafts present the same problem. As Nishimura says:

... they are so large that two or three families can easily find shelter in a hut built on each, and that they contain even patches of soil for cultivation of vegetables for the use of the raftsmen. It sometimes takes three years for raftsmen to reach their destination. The logs forming a raft are sold little by little en route when desirable and by the end of the voyage all the logs are sold and the raft naturally disappears.<sup>28</sup>

Other writers such as Donnelly have given similar accounts of these craft,<sup>29</sup> but nowhere do they precisely describe the hulls. Consequently, although one might suspect that they are similar to the tiered freighter type, it is not possible to be dogmatic about this.

In sum then, of the known Asiatic rafts only those of the Amur and

<sup>26</sup> Nishimura, op. cit., pp. 68-69.

<sup>27</sup> Ibid., p. 71.

<sup>28</sup> Ibid., p. 76.

<sup>29</sup> I. A. Donnelly, 'Strange Craft of China's Inland Waters,' *The Mariner's Mirror*, XXII (1936), 410-421.



the Yalu can safely be considered as similar to the Peruvian freighter. The others, as on the Volga and the Yangtze, are nothing more than likely candidates and must be treated with caution.

### Discussion

So little is known about these Asiatic freighters that any attempt to link them with their American counterparts is fraught with difficulty. In the forefront is the problem of chronology. All the rafts discussed above were observed in the modern period, and we have no direct, reliable means of placing them farther back in time.

Mythology can be used to demonstrate the ancient use of rafts in Asia. It seems to have been the basis of Jochelson's claim that the ancient Ainu, the hirsute and aromatic aborigines of Japan, originally came to the islands by raft.<sup>30</sup> Nishimura employed myths to substantiate the antiquity of various rafts in Japan, and also to reconstruct imaginative sea routes, running to Korea and other parts of Asia, upon which the raft supposedly was used.<sup>31</sup> Unfortunately, indirect evidence of this kind is not specific enough to permit identification of particular types of watercraft, so it is of little help in determining the age and origin of the freighter raft.

This brings us to the second problem, i.e. the origin of the freighter rafts of Asia. It could be that rafts like those of the Yalu and Amur were developed independently on some of the great rivers of Siberia, perhaps by men interested in shipping lumber downstream. Man has lived in Asia for hundreds of thousands of years.<sup>32</sup> There is little reason to doubt that during this long interval simple forms of raft were invented independently in various parts of the continent.

The question, however, is whether the freighter can be considered as a simple kind of raft. It is more complex than the crude one or two-layer rafts often used to move lumber or cargo. Man does not always use simple types of watercraft when need and environment seem to urge him to do so. It is conceivable then that early man failed to invent the rather elegant freighter raft more than once. The distribution in Asia of paleolithic,<sup>33</sup> neolithic,<sup>34</sup> and metallic<sup>35</sup> industries attest both to man's ability

<sup>30</sup> W. Jochelson, *Archaeological Investigations in Kamchatka* (Washington: Carnegie Institution, 1928), p. 70.

<sup>31</sup> Nishimura, op. cit., p. 49.

<sup>32</sup> See H. Movius, 'Early Man and Pleistocene Stratigraphy in Southern and Eastern Asia,' *Papers of the Peabody Museum*, XIX (1944), No. 3.

<sup>33</sup> Movius, *ibid.*; or W. Jochelson, *Peoples of Asiatic Russia* (New York: American Museum of Natural History, 1928), pp. 229-230.

<sup>34</sup> H. Michael, 'The Neolithic Age in Eastern Siberia,' *Transactions of the American Philosophical Society*, XLVIII, Pt. 2.

<sup>35</sup> See for example J. H. Gaul, 'Observations on the Bronze Age in the Yenisei Valley, Siberia,' *Studies in the Anthropology of Oceania and Asia, Papers of the Peabody Museum of American Archaeology and Ethnology*, XX (1943), 149-186.

to work wood and to the wide range of his migrations and contacts since the earliest times. What is there to say that he did not create the tiered raft once at some distant time level and spread it with him over the face of Asia? The recently observed freighter rafts could be interpreted as contemporary survivals of these ancient happenings.

The preceding discussion should demonstrate that the origins of the Asiatic freighter raft probably will remain mysterious. To argue independent invention or diffusion seemingly will always be possible, partly because of the nature of the raft itself, but chiefly because of the insufficient evidence available, particularly for aboriginal times.

None of this eliminates the possibility that the large Asian rafts could be the ancestors of the Peruvian freighter. Several routes of spread to the New World have always been available. The first is the coastal pathway via the Bering Straits. Carriage across the northern Pacific is also possible: the Kuro Siwo (Kuroshio) and other currents run from Asia to the west coast of North America (Plate 12). Moreover, records of drift voyages bear witness to frequent bridging of these waters in the past. In an eighteenth-century visit to Nijenei, a town at the mouth of the Kamchatka River, on the east coast of the Kamchatka Peninsula, the Frenchman de Lesseps encountered nine stranded Japanese. One of them told him that

... he and his companions had embarked in a ship of their own country, with an intention of visiting the more southern Kurilles islands, for the purpose of trading with the inhabitants. They directed their course along the coast, and were at a small distance from it, when they were overtaken by a violent gale, which carried them out to sea, and deprived them of all knowledge where they were. According to his account, which however I did not altogether believe, they beat about in the ocean for near six months without seeing land; of course they must have had a plentiful stock of provisions. At length they discerned the Aleutienne islands, and transported with joy, they determined to make for that coast, and without well knowing in what part of the world it was. They accordingly cast anchor near one of the islands, and a small shallop brought them to land.<sup>36</sup>

Jochelson also has mentioned a number of these drifts. One is very similar to that noted by de Lesseps, except that, like others recorded by Jochelson for 1710 and 1729, it reached only as far as Kamchatka.<sup>37</sup>

Then, too, MacMillan Brown has given what may be good supporting evidence for Oriental contact with Alaska. He reports that in 1913 a Russian farmer ploughing virgin soil dug up a lamp graced with a

<sup>36</sup> M. de Lesseps, *Travels in Kamchatka* (London, 1790), I, 208-209.

<sup>37</sup> Jochelson, *Archaeological Investigations in Kamchatka* (1928), p. 9.

Buddha-like figure, and also found some Chinese coins dating from the eighth century, A.D.<sup>38</sup> A Chinese 'cookie' of the gold rush days could have buried these, but it seems strange that he would be carrying eighth-century money.

However, it is a student of the Maori who has described the most amazing and significant of the drift voyages. Elsdon Best writes as follows:

Taking the case of the famous 'Black River,' a strong current running from the Japan Seas across to the American coast, we have on record numerous cases of drift voyages by this current reaching the west coast of North America. Thus in 1830 a Japanese vessel was wrecked on the coast of Vancouver Island, and a few years later another was wrecked on one of the Sandwich Islands. In 1815 Kotzebue found a distressed Japanese vessel off the California coast. She had been driven by a storm from the Japan Sea, and drifted across the Pacific for seventeen months. But three of her crew of thirty-five men remained alive; the others had perished from starvation.<sup>39</sup>

Other, seemingly physically impossible drifts are recorded from Japan to Mexico, Oregon and other parts of western North America.<sup>40</sup>

In spite of this evidence that the cargo raft could have reached North America by at least two northern routes there is nothing in the watercraft literature to indicate that it did so. No trace of a comparable craft has been found either in the Bering Straits-Aleutians area or along the west coast of North America.<sup>41</sup> Moreover, the traditions seem to point away from the freighter. Barbeau's study of Indian legends concerning migrations over the Aleutians to America makes no mention of it; on the contrary these may have been affected on double canoes.<sup>42</sup>

The other possible route to the Americas runs through the islands and waters of the central and southern Pacific. Myths, traditions and historical accounts bear witness to the widespread use of various rafts there in the past. A Samoan myth, in relating how these islanders first got canoes, mentions that previously they had used only rafts.<sup>43</sup> And tradition

<sup>38</sup> J. M. Brown, *Peoples and Problems of the Pacific* (London, 1927), II, 67.

<sup>39</sup> E. Best, *Polynesian Voyagers, the Maori as a Deep-Sea Navigator, Explorer and Colonizer* (Wellington: Dominion Museum Monograph No. 5, 1954), p. 24.

<sup>40</sup> *Ibid.*, pp. 24-27.

<sup>41</sup> See for example H. E. Driver and W. C. Massey, 'Comparative Studies of North American Indians,' *Transactions of the American Philosophical Society*, XLVII, Pt. 2; or R. L. Olson, 'Adze, Canoe and House Types of the Northwest Coast,' *University of Washington Publications in Anthropology*, II, No. I, 1-38; or J. R. Fernstrom, *The Geographical Distribution of Aboriginal Frame Watercraft in the New World* (Unpublished Master's Thesis, University of Maryland, 1956).

<sup>42</sup> M. Barbeau, 'The Aleutian Route of Migration into America,' *The Geographical Review*, XXXV (1945), 424-443.

<sup>43</sup> J. Hornell, *The Canoes of Polynesia, Fiji, and Micronesia* (Honolulu: Bernice P. Bishop Special Publication No. 27, 1936), p. 246.

attests to the former utilization of rafts for cargo work in Tonga and the Society Islands.<sup>44</sup>

The writings of various travelers and scholars of the European period support what is found in tradition. Thus, the raft is known to have been used in this century in the Society Group. Other rafts mentioned by Hornell for the Nissen Islands, the Bismarck Archipelago, and the Fiji Islands also could be examined with the cargo raft idea in mind.

Unfortunately it once again is very difficult to acquire an adequate picture of most of these rafts. The descriptions are not specific. Nevertheless, from them emerges the idea that the typical carrier for centuries, over much of the Pacific, did not resemble the large Peruvian freighter raft. Rather it was a smaller craft, built of bamboo, with little or no tiering, and very seldom equipped with huts, gardens, fires and other aspects of the latter raft.

Consider the rafts of the Marianas as an illustration. According to Hornell

... a Yap raft called *jofod* or *virar* has been described by Muller. It is a rectangular bamboo float with a raised central platform as in the Palau *prer*. Rafts of still larger size are stated ... to have been employed formerly for the transport of the larger sizes of the Yap stone money from Babelthuap, the island in the Palau Islands where it was quarried and fashioned to shape.<sup>45</sup>

These rafts must have been seaworthy indeed to make the more than two-hundred-mile ocean trip between Yap and the Palaus. Moreover such trips leave little doubt whatsoever that the Yap raft is of the same stock as the *prer* of the Palaus. The *prer*

... is usually about 3 feet wide and 20 to 26 feet long. It consists of nine or ten thick bamboos placed side by side and held in position partly by thin stakes driven transversely through them and partly by lashings made of the flexible stems of forest creepers. Such a raft is most useful for the single fisherman visiting the reefs at low tide in search of crabs ... and is a great favorite with the poorer people. The more carefully made ones have erected over the center part an elevated platform on which the fisherman has a dry place. ...<sup>46</sup>

That such rafts lie outside the large freighter class seems certain. It could be argued that they represent the adaptation of the same idea to a more slender, workable raw material, the bamboo: but this would not

<sup>44</sup> This and immediately subsequent references to rafts of the various island groups are from the Bernice Bishop publication 27 by Hornell. They can be located as follows: Tonga, 273-274; Society Islands, 143; Society Group, 143; Nissen Islands, 120; Bismarck Archipelago, 132; and the Fiji Islands, 330.

<sup>45</sup> Ibid., p. 412.

<sup>46</sup> Ibid., pp. 435-436.

account for the absence of tiers. On the other hand they may represent a distinctly different line of watercraft development, perhaps related to somewhat similar bamboo rafts used in Formosa and southeastern Asia. The fact that these rafts were capable of traversing hundreds of miles of open ocean does much to strengthen this possibility.

Thus in the central and southern as well as the northern Pacific there is no evidence for the present or former use of a raft similar in form to the Peruvian freighters. This leaves the Asiatic rafts as the only craft anywhere that are at all comparable to them. There is therefore very little to support the idea that these two are of the same origin.

#### *The Distribution of the Shaped Log Balsa of Peru*

The second type of Peruvian log balsa, constructed as it is of an uneven number of logs, with a long center log and a finger-shaped prow, is a peculiar and specific type of watercraft. One which is complex enough so that it is less easy to visualize its independent development on waterways where man and timber have tended constantly to drift downstream.

Other log rafts of South and Central America, California, Southeastern Asia, India, Southern Arabia, Abyssinia, the Red Sea, the Mediterranean and the islands of the Pacific seem to, or have been said to, resemble this shaped log balsa. However, not all of them can be so considered; rather they seem to represent lines of development distinct from that of the Peruvian raft. Nevertheless they are described as completely as possible below so as to provide ample basis to independently evaluate their relationships to the log balsa of Peru.

#### *South America*

In South America the raft was a common mode of water transport. Apparently some tribes used nothing but various rafts for water travel in aboriginal times.<sup>47</sup> And the degree to which they clung to them when seemingly better craft became available suggests long-time use.<sup>48</sup>

A study of Steward's *Handbook of South American Indians* reveals rafts scattered among the Guarani, the Yamiaca, the Chiriguano, the Leco, the Campa, the Zaparoan, the Chango, the Tupinamba and so on (Plate 13).<sup>49</sup> Thus the raft was used in the mountains, on the slopes and montana, in

<sup>47</sup> J. H. Steward and A. Metraux, 'Tribes of the Peruvian and Ecuadorian Montana,' *Handbook of South American Indians*, III (1948), 574.

<sup>48</sup> *Ibid.*, p. 642.

<sup>49</sup> The following are references to the various volumes of the *Handbook of South American Indians*, ed. Julian H. Steward: Guarani, III, 83; Yamiaca, III, 454; Chiriguano, III, 473; Leco, III, 505; Campa, III, 544; Zaparoan, III, 642; Chango, II, 596-597; Tupinamba, III, 109.



the interior forests and along the coasts of Brazil and the dry plains of northern Chile.

Many of these rafts could be classified as what Friederici has called 'occasional' balsas.<sup>50</sup> This includes those craft which were made of comparatively ubiquitous materials. Typically they were used quickly for crossing streams or other water bodies, i.e., they were of temporary kind. But this was not always true. Other relatively unknown and poorly described types also were put into this class. When it became difficult to decide just how to classify a raft, Friederici tended to leave it in the occasional raft group. As a result this included everything from tree trunks and branches through driftwood, reed and rush rafts. Such rafts were used all over America, from the Arctic to southernmost Chile.

But interestingly enough Friederici did not tend to classify little-known rafts used in areas close to the ancient Peruvian civilizations as occasional balsas. Those of the Beni and the Mamore as well as other tributaries of the upper Amazon and Madeira were said to be of the log balsa class.<sup>51</sup> One feels safe in assuming that he saw a genetic connection in these instances primarily because proximity to Peru, and the known movements and expeditions of the Inca and their predecessors, made diffusion exceedingly likely.

The same view is held in this study so far as the log rafts of tribes such as the Mosetene and the Arawak are concerned. The modern raft of the Mosetene, a tribe of the eastern slopes of the Bolivian Andes, is made of

... seven logs of palo de balsa, a very light wood, nailed together with chonta spikes and provided with a platform to keep goods dry. The long central logs consist of two trunks laid end to end. Some rafts have a raised prow constructed of bent pieces of wood attached to three middle logs. The raised bow and platform were introduced in modern times when the Mosetene handled most of the river traffic on the upper Beni River.<sup>52</sup>

Among the Arawakan tribes of the Peruvian and Ecuadorian montana the Campa make pointed balsa rafts held together with chonta nails and cross beams.<sup>53</sup>

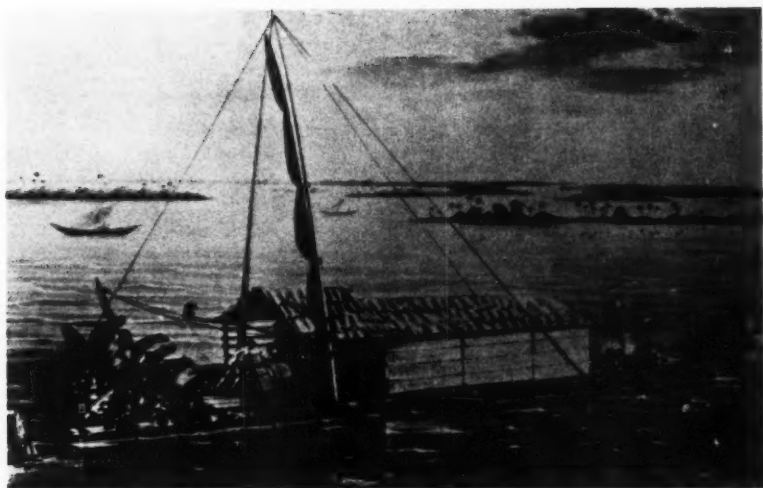
However, such information on recent use of log balsas in areas close to Peru does little to help us decide about its origin in that region. The more distant and therefore more significant Tupinamba, who occupied a stretch of the Atlantic coast roughly conformable to the boundaries of

<sup>50</sup> Friederici, op. cit., pp. 24-25.

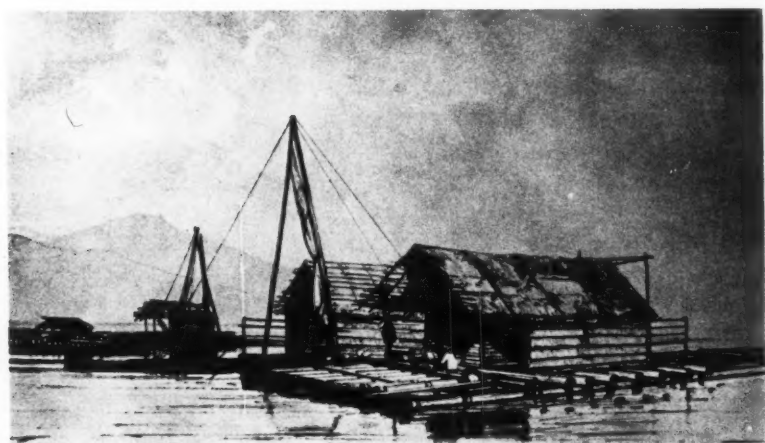
<sup>51</sup> Ibid., p. 25.

<sup>52</sup> A. Metraux, 'Tribes of the Eastern Slopes of the Bolivian Andes,' *Handbook of South American Indians*, III (1948), 494.

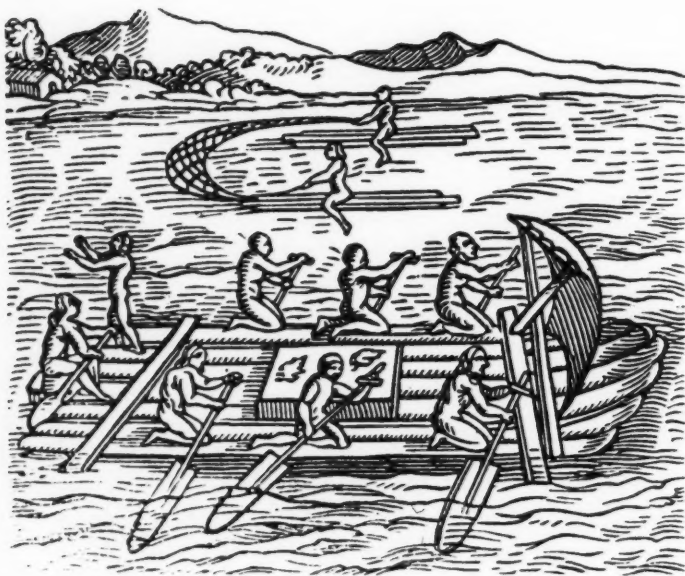
<sup>53</sup> Steward and Metraux, op. cit., III (1948), 544.



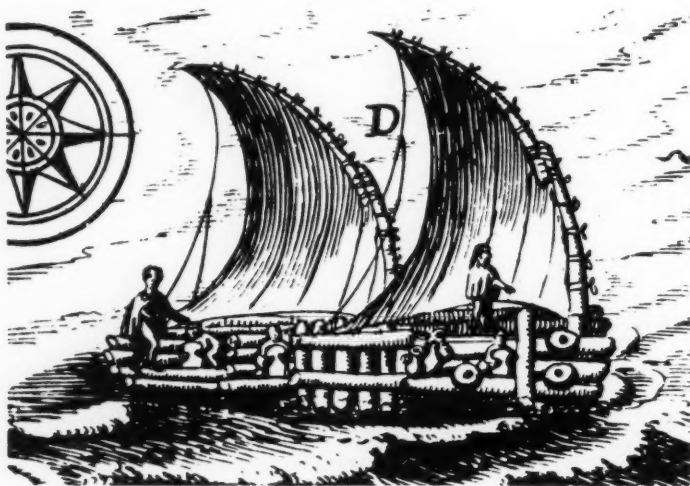
Humboldt's nineteenth-century illustration of a balsa raft in the Guayas River, from Heyerdahl 1952



Paris' representation of balsa rafts moored in Guayaquil Harbor in the nineteenth century, from Heyerdahl 1952



Benzoni's well-known woodcut of balsas  
as seen in the sixteenth century,  
from Hornell 1931



The balsa raft as seen by Spilbergen about 1615,  
from Heyerdahl 1952



present-day Bahia, used small log rafts for fishing. According to Metraux these were made of four or five thick round pieces of light wood bound together with creepers, and propelled with a flat stick.<sup>54</sup>

On the other hand, Friederici described two different types of raft on the east coast; the first he compared to the *piperis* of the Caribbean Islands. These were said to consist of three to six short logs set close together in an organ-pipe arrangement with a length of about 1.65 meters and a width approximating 0.70 meters. One fisherman was carried.<sup>55</sup>

He classified the second, the *jangada*, as a separate type of raft chiefly because it exhibited differences in size, form and perhaps in wood used for construction. His opinions seem to be based on observations of modern rafts, for he assumed that if no changes had taken place in the present-day craft from the time of the original inhabitants the *jangadas* must have been cut square both fore and aft.<sup>56</sup>

On the other hand, Friederici found the *jangada* and *piperi* alike in the sense that they were constructed of both an even and uneven number of logs. However, these two subtypes appear to have been dominant in different areas. The *jangadas* of the Bahia region were constructed of an even number of logs; whereas those of the province of Ceara were mostly five-log craft.<sup>57</sup>

Friederici stated that the Brazilian *jangadas* of his day were a very refined reproduction of the Tupi craft.<sup>58</sup> What he meant by this is a problem. But he may be inferring that, in his opinion, these craft represent improvements since European contact.

Suder, writing in 1930, claimed that the Tupi rafts were often made of bamboo and showed a peculiar form, being raised throughout their complete width in the bow. He also noted, as Friederici did not, that a mast, sails and centerboard were used on these craft. In addition he made some comments on their ability to go far out to sea, and on their improvement by Europeans.<sup>59</sup>

In 1940, Lane-Poole found the *jangada* to be common in the Amazon delta and as far south as Pernambuco. He was particularly impressed with the seaworthiness of this raft and the durability of its crews. The native sailors used the raft to exploit fishing grounds as much as one hun-

<sup>54</sup> A. Metraux, 'The Tupinamba,' *Handbook of South American Indians*, III (1948), 109.

<sup>55</sup> Friederici, op. cit., pp. 22-23.

<sup>56</sup> Ibid., p. 23.

<sup>57</sup> Ibid., p. 23.

<sup>58</sup> Ibid., p. 23.

<sup>59</sup> H. Suder, 'Von Einbaum und Floss Zum Schiff,' *Institute für Meereskunde*, Heft 7, Neue Folge (1930), p. 88.

dred miles off shore and in so doing often stayed at sea for three days. In 1922 one crew performed a remarkable voyage atop a *jangada*, sailing from Recife to Rio and back, a distance of 2,144 miles.<sup>60</sup>

As Lane-Poole described it the *jangada* varied in construction from . . . a collection of hop-poles lashed together like a collapsed five-barred gate to the well-built example illustrated in Figure I.<sup>61</sup> (Plate 14, upper left.)

All these accounts combine to leave a confused picture of the rafts of eastern South America. Two basic types apparently were used, of which one, the organ-like *piperi* must be considered similar to the shaped Peruvian log balsa. On the contrary the *jangada* type with its uptilted, straight-cut prow cannot be classified in the same category, and in fact seems to bear no specific structural resemblance to any of the Peruvian log craft. Another problem so far as these eastern rafts are concerned is dating; Friederici merely seems to have assumed that the hull of the *piperi* is aboriginal. Nor did he mention anything about accessories such as centerboard and sails. These are included in the descriptions by Suder and Lane-Poole; but they undoubtedly are based for the most part on recent observations, so we do not know how closely they correspond to aboriginal conditions.

#### Central America

Information on log-raft balsas is very meager for Central America. Suder reports the use of a log raft along the southern part of the Pacific coast, within the Gulf of Nicoya, as well as on the Atlantic side of the Caribbean.<sup>62</sup> The Atlantic reference is probably to the Antilles. Friederici also discussed log rafts in the Caribbean very briefly, as well as alluding to the use of wooden balsas by the Tarask fishermen on the lakes of Michoacan in southwestern Mexico. However, no detail whatsoever is available for this last occurrence.<sup>63</sup>

All we know about the so-called *piperi* of the Caribbean Islands is that, like the rafts of the Tupi of eastern Brazil, it was constructed of from three to six short logs in organ-pipe arrangement.<sup>64</sup> In his admirable paper on the canoes and navigation of the Maya, Thompson mentions the few shreds of evidence which might suggest that these people used log rafts. This consists chiefly of some highly conventionalized drawings of

<sup>60</sup> R. H. Lane-Poole, 'Primitive Craft and Mediaeval Rigs in South America,' *The Mariner's Mirror*, XXVI (1940), No. 4, 335.

<sup>61</sup> *Ibid.*, pp. 335-336.

<sup>62</sup> Suder, *op. cit.*, p. 85.

<sup>63</sup> Friederici, *op. cit.*, p. 22.

<sup>64</sup> *Ibid.*, pp. 22-23.

what might pass for rafts.<sup>65</sup> It is Thompson's opinion that these probably were built either of reeds or of a wooden platform supported by gourds.

Considering the paucity of these sources, the information given by Wafer is quite valuable.<sup>66</sup> Lionel Wafer was a surgeon on various English buccaneering expeditions into Darien, the West Indies, and the Pacific during the years between 1680 and 1688. He came to know the Isthmus and its Indians quite well, living some four months among what apparently were the Cuna in 1681.<sup>67</sup>

Of much interest is his account of rafts seemingly similar to the Peruvian types in use among these Indians. Although the Cuna were probably the people concerned, this is not certain. The Choco, a group related to the Chibcha, aboriginal inhabitants of contemporary Colombia, also were in the region at this time.

That we have Wafer's comments at all is due really to chance, for they constitute no more than a small aside to a discussion of vegetation. In speaking of Light-wood, which must have been either balsa or another similar wood, cuipo, Wafer states

Tis so very light in Water that three or four Logs of it, about as thick as one's thigh and about four Feet long, shall make a Rafter on which two or three Men may go out to Sea. The Indians make large Rafter of it upon occasion, after this manner: they take Logs of this wood not very big, and bind them together collaterally with Maho-Cords, making of them a kind of Floor. Then they lay another Range of Logs across these, at some distance from each other, and peg them down to the former with long Pins of Macan-wood; and the Wood of the Float is so soft, and tenacious withal, that it easily gives admittance to the Peg upon driving, and closes fast about it. The Floats were they boarded, would resemble our Dyers-floats in the Thames at London, and the Indians use them chiefly for passage across a great River where Canoa's or other trees are wanting; or for fishing.<sup>68</sup>

Admittedly this description affords a less than ideal basis for comparison with other watercraft especially from the standpoint of form. Nevertheless, the small raft can be tentatively linked with the Peruvian balsilla and the large Rafter with the freighter type raft of South America.

#### *North America*

According to Driver and Massey nothing remotely resembling the huge log rafts of the western Amazon and Peru was known to the North

<sup>65</sup> J. E. S. Thompson, 'Canoes and Navigation of the Maya and their Neighbours,' *Journal of the Royal Anthropological Society*, LXXIX (1951), 70.

<sup>66</sup> L. Wafer, *A New Voyage and Description of the Isthmus of America* (Oxford: Hakluyt Society, 1937).

<sup>67</sup> *Ibid.*, p. xxvi.

<sup>68</sup> *Ibid.*, pp. 59-60.

American Indians.<sup>69</sup> However, there is evidence for the use of an odd-log, shaped raft similar to the Peruvian medium balsa along the California coast. Friederici described those of the southern part of the California Peninsula as consisting of three, five or seven logs of very light wood, called corcho. These were tied together in organ-pipe arrangement with the middle log longer than the rest. If Friederici is correct, these craft could carry three men six to eight kilometers into the sea to fish. The German scholar also mentions a different type of raft, composed of two very large cedar logs which were tied together and used by four to seven men for trips far out to sea.<sup>70</sup> He confines its use to the Islands de los Cedros farther north along the Peninsula. Suder's classic study makes reference only to this two-log type.<sup>71</sup>

In their unique work on primitive navigation along the California coasts Heizer and Massey note the use of shaped, odd-log rafts.<sup>72</sup> They quote Clavigero, a Jesuit inhabitant of Mexico for thirty-five years prior to 1767, who wrote that

In order to fish on the high sea in this second way they use a simple raft composed of three, five, or seven logs fastened together with sticks and well tied; the log in the middle, which extends farther because of being longer, serves as a prow. The wood from which these rafts are made is cork (a tree already described by us) because it is lightest. On each of them, according to their size, 2 or 3 men take their places and depart 4 or 5 miles from the coast, without fear of the very high waves of the Pacific Sea. . . .<sup>73</sup>

#### *Discussion of the Shaped Log Balsas of the Americas*

Some judgments must now be made. We know that, during European times, a shaped, odd-log raft, comparable in type to Estrada's medium balsa of western South America was used in California, some islands of the Caribbean and Brazil. But beyond this chronological data is very uneven and incomplete. Time depth is best for the Chilean-Peruvian coast where archaeological evidence suggests this craft has been known at least since the time of Christ. This evidence consists of centerboards, and of toy rafts and a sail recovered from graves in northern Chile. The well-developed nature of these materials, and the religious overtones suggested by burial with the dead point to a long-time role in this culture and

<sup>69</sup> Driver and Massey, *op. cit.*, p. 292.

<sup>70</sup> Friederici, *op. cit.*, p. 22.

<sup>71</sup> Suder, *op. cit.*, p. 85.

<sup>72</sup> R. F. Heizer and W. C. Massey, 'Aboriginal Navigation off the Coasts of Upper and Baja California,' *Smithsonian Bulletin* 151, *Anthropological Paper* 2, No. 39 (1953), p. 300.

<sup>73</sup> *Ibid.*, p. 300.

to a great age. In other areas the shaped rafts seem best considered as aboriginal. Nothing is certain for very early times, although there are suggestions of great antiquity. Chief among these is the widespread distribution of the craft. Implicit in this statement is the idea that the shaped rafts of all four areas are of common origin.

There are several reasons for believing that the distribution of this raft is a result of diffusion. One is that Panama and the regions to the south seem to have been in contact with one another at an early date. Dampier, whose voyage along the coast of Ecuador and Peru has been noted previously, reported that the large freighter raft was a means of effecting trade between these areas and Panama. As he saw them in 1684 they carried

... 60 or 70 Tuns of Goods and upwards: their Cargo was chiefly Wine, Oil, Flower, Sugar, Quito-Cloth, Soap, Goat-Skins drest, etc. The float is managed usually by 3 or 4 Men, who being unable to return with it against the Trade-wind, when they come to Panama dispose of the Goods and Bottom together: getting a passage back again for themselves in Some Ship or Boat bound to the Port they came from; and there they may make a new Bark-log for their next Cargo.<sup>74</sup>

Granted this observation was made more than one hundred and fifty years after initial Spanish contact along this coast. And it could be argued that such a trade would be impossible until European times. This would rest on the assumption that once the large rafts were broken up there would be no way of making the return trip in the aboriginal period. Such an interesting suggestion runs afoul of evidence for pre-European use of boats quite capable of making the back trip. Estrada has described dugouts up to forty feet long and equipped with three log balancers or outriggers which are known from datable pottery to be at least one thousand years old on the Ecuadorian coast.<sup>75</sup> Corroborating evidence for aboriginal contact and trade between Panama and Ecuador is the statement made by Comogre, a great chief of Panama, to Balboa that he knew of a rich coastal empire to the south whose people navigated the Pacific in ships using sails and paddles.<sup>76</sup>

No comparable evidence for contact between Peru or Panama and California seems to be available. However, there is little reason to doubt that the California shaped raft is of the same origin as those used in the south. Nowhere else in North America was such a highly developed raft employed. It is difficult to believe that among all the Indian peoples of

<sup>74</sup> Estrada, *op. cit.*, p. 143.

<sup>75</sup> *Ibid.*, p. 148. See C. S. Chard, 'Pre-Columbian Trade Between North and South America,' *Kroeber Anthro. Soc. Pap.* No. I, 1-27, for details.

<sup>76</sup> Heyerdahl, *op. cit.* (1955), p. 253.



this continent only the relatively primitive fishing peoples of California should have invented the shaped log balsa.

In addition the California raft was used only in isolated pockets, close to cedar groves if Heizer is correct. This suggests preservation of an ancient form of watercraft in environmentally suitable areas. The use of wooden balsas on the Michoacan Lakes, the Gulf of Nicoya and the waters of the Isthmus indicates there may have been a much greater use of Peruvian type log balsas along this whole coast in the past. True, only the rafts of Panama are known well enough to suggest a link with those of Peru. Yet, despite the obscurity of their form, the Mexican and Nicoyan occurrences suggestively fill out a log raft pattern stretching discontinuously from Chile to California. Finally, the Indians of southern California used reed balsas somewhat similar to those found in Peru. These also could be viewed as an independent invention, especially as there are some differences in form between the two, or they could be looked on as further support for diffusion from the south into California.

Some information on Peruvian penetrations into the South American interior during late aboriginal and early Spanish times also is on record. Friederici has alluded to the attack led by Inca Yupanqui, on a fleet of balsas, against some hostile tribes living along a tributary of the Madeira River, a tributary of the Amazon.<sup>77</sup> There is no reason to assume such expeditions were rare in the history of this area. Friederici has made reference to the trade of the Chibchas, ancient peoples of present-day Colombia, along the Magdalena River, and to the use of log balsas, of unknown kind, on their lakes.<sup>78</sup> Then too the Chocos, relatives of the Chibcha, were living in juxtaposition to the Cuna of Panama in the 1600's. All of this evidence for contact along the Gulf coast and the interior supports the idea that the shaped log rafts of California, the Caribbean and eastern South America are of the same origin as those of Panama or Peru.

If present knowledge is to be the guide we must conclude that the shaped log balsa probably spread from Peru to the other areas where it was used in the Americas. Archaeology demonstrates that it is oldest there; and that the transfer could have been effected either directly or indirectly as a result of the demonstrated movements of the ancient Peruvians and their neighbors.

It should be emphasized, however, that the chronological evidence can in no way be considered as fixed. The dating is not final, it is simply an expression of what work has been done and of what is known about

<sup>77</sup> Friederici, *op. cit.*, p. 23.

<sup>78</sup> *Ibid.*, p. 23.

these areas at present. Past archaeological efforts have shown that the shaped raft is ancient in Peru; in future they may show it to be even older in California.

However, if this line of reasoning encourages us to remain suspicious that the shaped log balsa came into the Americas from the north, the distributional evidence does not. This raft, like the freighter, is unknown in North America outside of southern California. Even so, it is possible that such rafts were used, but disappeared with the introduction and development of the very effective dugouts and skin boats used by the aborigines of western North America.

A study of the distribution of Old World and Oceanic watercraft similar to the shaped log balsa obviously is necessary at this point. It will permit the affirmation or denial of the evidence against the spread of this raft into the New World around the northern route and also will help to assess possible relationships between the Peruvian rafts and those of the Pacific.

#### *Korea-Japan-Formosa-Southeast Asia*

In this region a few primitive rafts survive to indicate that the log raft probably was used on a wider scale in the past. But any accurate estimation of their age is impossible. In fact little beyond the studies of Shinji Nishimura, great student of Japanese maritime history, attests to their antiquity. Such lack of direct temporal evidence is typical of the Old World and Oceanic shaped rafts.

As late as 1925 a primitive type known as *pal-san* was used chiefly about Nam-hai and Chyoi-jyu islands off the south coast of Korea for fishing and collecting seaweed. As Nishimura describes them,

Each consists of several logs (usually an odd number) for buoyancy and stability, and on the structure a platform or upper deck is made to prevent fishermen and their fishing-implements from being washed away by the waves. The size of a raft-boat is not fixed and varies according to material used. As a specimen I may give a description of a *pal-san* in use on Chyoi-jyu Island—this raft consists of seven logs, and is 20 ft. long and 5 ft. broad. It has a platform and a ro-lock. The platform is 5 ft. in length, about 3 ft. in breadth, and 2 ft. in height. The frame work is made of slender wood poles, on which is a floor of twigs or stems of bamboos or reeds or rushes. The platform serves the same purpose of protecting men and things from water as the tub-shaped seat of the *tek-pai* (bamboo raft) in use in Formosa, chiefly in the harbour of Takao.<sup>79</sup>

This raft has some similarities to the shaped Peruvian log balsa. Most notable is the odd-log arrangement (Plate 14 lower left) although the

<sup>79</sup> Nishimura, op. cit., pp. 59-60.

single layer of logs in the hull and the low railing are like those in some Peruvian types. But these resemblances certainly are not strong: in fact it is the differences that are striking and significant. Thus, there is no long center log in the Korean raft, nor is there a trace of shaping; both prow and stern are remarkably straight. Accessories such as mast, sail and centerboard also are absent.

This craft is, therefore, considered to be outside the Peruvian balsa category. Serving similar functions, it is, nevertheless, a representative of a different line of development.

The bamboo rafts of Formosa and Indo-China are among the best known of all primitive rafts.<sup>80</sup> That they too constitute a raft type distinct from the shaped log balsa of Peru cannot be doubted. In the Formosan rafts, the hull (Plate 14 upper right), the section of greatest significance to us, is composed of an indefinite number of logs, either odd or even, shaped in a manner entirely different from the South American types. If their prow and stern cannot be described as square, then it must be said to take a shape opposite to the Peruvian craft, with the longest logs on the outer sides. Longitudinal sheering is present in varying degrees in both Southeastern Asian and the Formosan types. Paris' figures of the Indochinese varieties portray a marked cross-sectional sheer as well (Plate 14 lower right).<sup>81</sup>

Heine-Geldern illustrates a raft from Thanh-hoa Province, in northern Annam, which differs somewhat in form from Paris' models.<sup>82</sup> Like them it has square sails, centerboards, a steering oar and a platform or box set somewhat aft. It departs from them in having a rather pointed prow of slightly upcurved bamboos, and in its comparatively flat-bottomed hull.

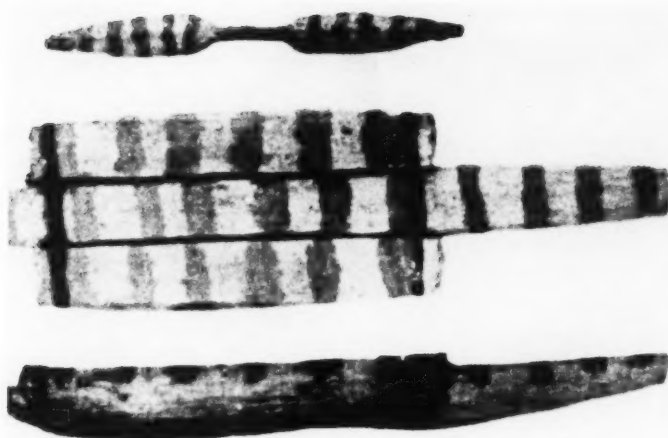
It is not the aim of this paper to investigate the origins and affinities of these craft. But there seems to be little doubt that they share a common origin. Particularly is this true of the raft types represented by Paris and Nishimura; as their unusually high degree of resemblance suggests. The proximity of their areas of use to one another, the seaworthiness of the craft and the intrepid maritime attitude of their owners are further, very substantial basis for such a statement. To what extent the Heine-Geldern model is distinct from these two is uncertain. Further investigation beyond the scope of this paper would be required to answer this question.

<sup>80</sup> See for example, Nishimura, *op. cit.* (1925), pp. 127-135; G. R. G. Worcester, 'Four Small Craft of Taiwan,' *The Mariner's Mirror*, XLII (1956), No. 4, 302-312; or J. Hornell, *Water Transport* (Cambridge, 1946), pp. 88-90.

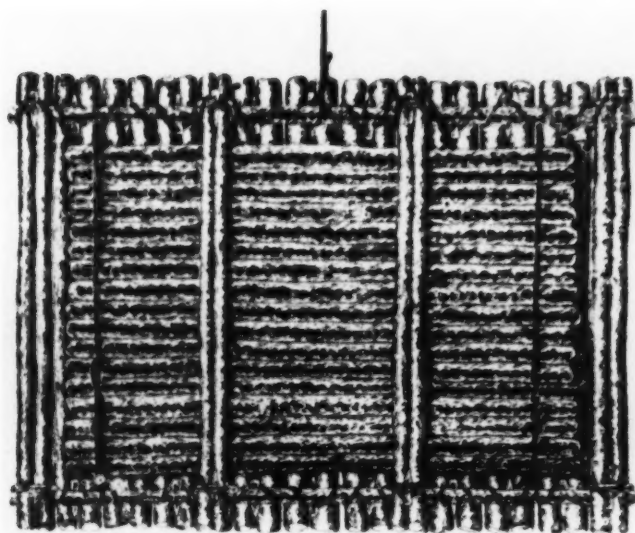
<sup>81</sup> In P. Paris, *Esquisse d'une ethnographie navale des peuples Annamites* (2nd. ed., Rotterdam: Museum voor Land-en Volkenkunde en Maritiem Museum 'Prins Hendrik,' 1955); see Plates 45-52.

<sup>82</sup> Heine-Geldern, *op. cit.* (1954), p. 408.

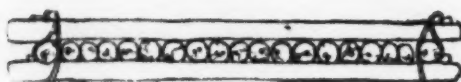




Small replicas of the balsa raft, adapted from Heyerdahl 1952



Top view

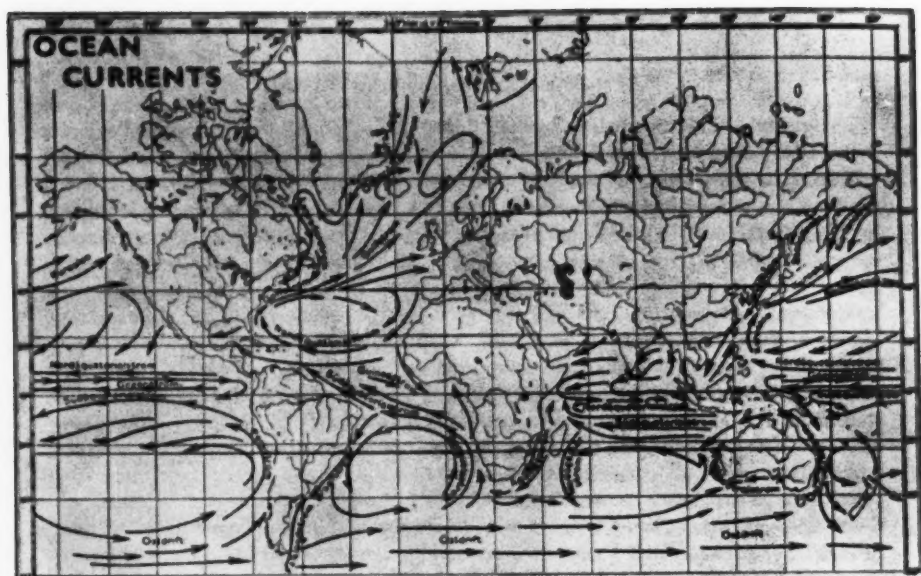


Side view.

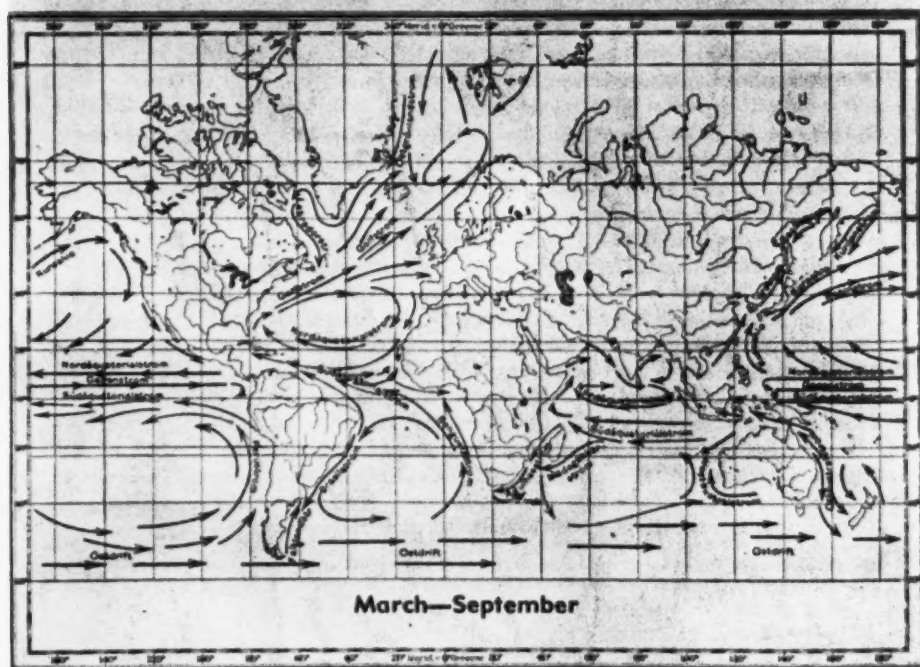


Front view.

Modern Amur River rafts, from Nishimura 1925



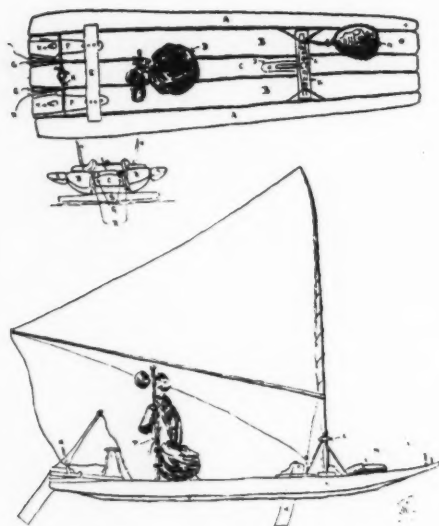
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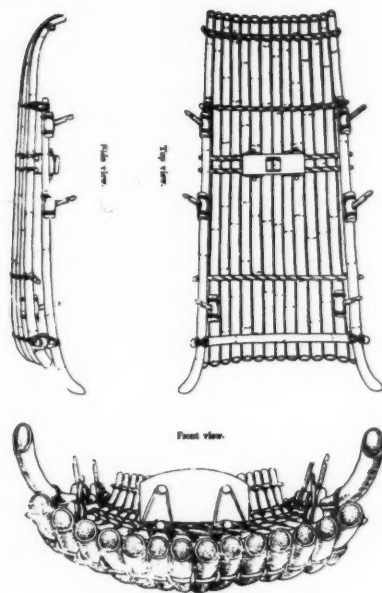
Ocean currents of the world, from Heyerdahl 1952



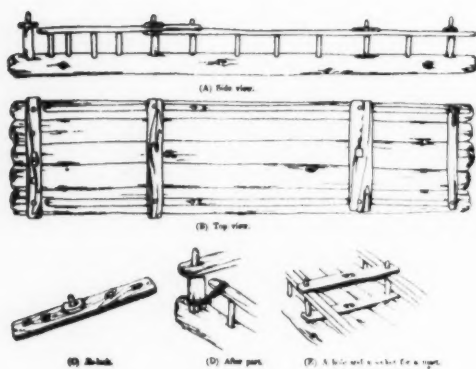
Index to South American Tribes and Places



A well-constructed twentieth-century jangada,  
after Lane-Poole 1940



Structure of a Formosan raft or  
*Tek-pai*, after Nishimura 1925



Structure of a Korean raft,  
after Nishimura 1925



An Indochinese raft with centreboards,  
after Pierre Paris 1954

A few additional points should, however, be made before we leave these bamboo craft to study the log rafts of India. First, Heine-Geldern suggested considerable age for his type of bamboo craft by pointing out that it is still used today by fishermen living and working in the area formerly occupied by the Dongson culture.<sup>83</sup> This complex has been dated as thousands of years old.<sup>84</sup> Nishimura has seen much antiquity in the Formosan raft.

It is thought by the natives that the raft once had a wide distribution, extending from Formosa, through the Malayan Islands to Australia, and the communication between the two extremities of these regions was effected in these remote times by this primitive water carriage, but at present it has disappeared from the Malayan Islands and its vicinity and merely remains in some part of South Formosa.<sup>85</sup>

The similarity of the *perer* and the *vivar*, the previously described bamboo rafts of Babelthuap and Yap, to the Southeast Asian rafts lends some support to these thoughts of Nishimura's.

#### *India and Ceylon*

A variety of shaped rafts has been reported for Southeastern India and parts of Ceylon (Plate 15 upper). Hornell has described many of them. Most show some characteristics similar to the shaped, odd-log rafts of the Americas; but there are several which resemble them very closely indeed. It is to these that special attention is directed.

The *periya maram*, a raft of the Coromandel Coast, is constructed of four logs, two of which project aft about four feet to serve as a place for the steersman.

At the forward end, where the four planks end abreast, the two marginal ones are worked down on the outer side to a blunt point at the fore end and the whole is then finished off by the addition of two narrow, wedge-shaped twin stem-pieces, to form a sharp, upwardly curved prow. The total overall length is 25 feet 6 inches, with an extreme breadth of only 3 feet 6 inches.<sup>86</sup>

Another small raft, the *chinna maram* (small logs) is used to assist this raft in handling fishing nets. Of simple design, it is constructed of three logs with a single beak-like stempiece. The stern is marked by a projecting middle log.<sup>87</sup>

<sup>83</sup> Ibid., p. 80.

<sup>84</sup> C. Furer-Haimendorf, 'Culture History and Culture Development,' *Yearbook of Anthropology* (New York, 1955), pp. 149-181.

<sup>85</sup> Nishimura, op. cit., p. 127.

<sup>86</sup> Hornell, op. cit., *Water Transport*, p. 64.

<sup>87</sup> Ibid., p. 65.



Of greater significance than the preceding craft is the *irukka maram*, a raft used for drift-net fishing on the Coromandel Coast.

This is closely akin to the *periya maram*, but consists of five logs instead of four; the median or odd log, being the longest, projects aft some distance beyond the inner lateral ones, which in turn project farther aft than the outer laterals. The stern end therefore is a series of steps. The beak prow is here formed of three stempieces fitted abreast, whereon is hooked a single fluke wooden anchor with stone-weighted shank. A rowing rail is present and mast and sail of the usual type are carried.<sup>88</sup> (Plate 15, middle)

It is not quite clear just what the usual sail is, but Hornell probably is referring to the lateen type.

A somewhat simpler and smaller form

... constructed of five logs unprovided with any beak prow and equally without sail and rowing rail is used in line-fishing and hence is called *thundil maram* or 'hook catamaran.'<sup>89</sup> (Plate 15, middle)

The *kola maram*, although not as strikingly similar to the Peruvian medium balsa as the *irukka* or *thundil maram*, is another craft of unusual interest. This, the largest of the rafts of the Coromandel Coast, is used only in the clear-water season of July and August.

It is designed and built solely for the prosecution of the flying-fish fishing. As the catamarans have to go comparatively far out to sea to find the shoals—up to 25 miles from land—and have to be prepared to stay at sea up to three days if necessary, they are of unusually great size. The hull is invariably composed of sewn main timbers with an accessory one lashed upon the starboard side whereon men squat when scooping up the fish. All the timbers are especially shaped and these, being narrowed at the fore end, give a cuneate form to the craft, completed by the addition of an upturned prow of five stempieces, lashed on securely. The proportions are carefully worked out to give the hull an elegantly crescentic form, concavely curved above both longitudinally and transversely. This makes it an ideal skimming craft—the draft being barely a foot when loaded. But though of such shallow draft and without a keel, she is able to beat against a wind fairly well, for when this is necessary two powerful leeboards are brought into action, one abreast the forward mast (two are carried), the other at the stern, nearly abreast of the steering paddle, which of itself functions as an efficient leeboard and is of the same shape.<sup>90</sup>

Apparently these craft often had two short masts, raked somewhat forward, on which were set sails which probably would be classed as lateen. Among the other accessories were four short, thin, bladelike paddles, with one beaded edge, three rowing oars and a narrow scooplike bailer

<sup>88</sup> Ibid., p. 65.

<sup>89</sup> J. Hornell, 'Indian Boat Designs,' *Memoirs of the Asiatic Society of Bengal*, VII (1920), 171-172.

<sup>90</sup> Hornell, op. cit., *Water Transport*, p. 66.

for the sails.<sup>91</sup> This equipment seemingly was not a panacea for navigational problems. For it is reported that these rafts sometimes were blown so far to leeward that they traveled twenty to fifty miles beyond their point of departure.<sup>92</sup>

All these rafts can be considered as fairly representative of the Indian types. But emphasis must be placed on the fact that much variation of one kind or another in construction is characteristic of the craft of this region. Thus, some have little shape beyond a gradual, concave curve of the planks; others have the side logs set well above the center one. Some even have deep washstrakes added to each side to keep the crew and gear dry. These approach the boat idea much more than any other raft type. In addition, instead of lashing, some rafts are pegged to one another with wooden pins.

But these rafts have certain stable elements which resemble those of the shaped Peruvian rafts to an amazingly high degree. Characteristically they are constructed of an odd number of logs, although an additional one sometimes is placed on one side or the other to facilitate fishing, as on the *kola maram*. The central log typically is much longer than the others and generally projects both fore and aft. Thus, the prow often has a pointed shape, modified by cutting and reworking the logs, or adding a stempiece. Only the heightening of the hull with this device can be considered as a marked deviation from the South American pattern. Among the accessories, the lateen sail and centerboard appear to have been in common use.

When we try to ascertain the age of these Indian rafts we encounter great difficulty. The oldest positive description seems to be Edye's account of 1834. He writes that:

... the catamarans of the island of Ceylon—like those of Madras, and other parts of the coast of the peninsula, are formed of three logs of timber, and are used by the natives for similar occurrences: the timber preferred for their construction is of the dup wood, or cherne—maram (pine-tree). Their length is from twenty to twenty-five feet, and breadth two and a half to three and a half feet, secured together by means of three spreaders and cross lashing through small holes; the centre log being much the largest, with a curved surface at the fore-end, which bends or finishes upwards to a point. The side logs are very similar in form; but smaller, having their sides straight, and fitted to the centre-log. . . .<sup>93</sup>

Unfortunately Edye, like Hornell, had nothing specific to say about

<sup>91</sup> Hornell's illustrations of the *kola maram* are fairly well known. See Plate XI in his *Water Transport*.

<sup>92</sup> *Ibid.*, p. 67.

<sup>93</sup> J. Edye, 'Description of the Various Classes of Vessels on the Coasts of Coromandel, Malabar, Ceylon etc.', *Journal of the Royal Asiatic Society*, I (1834), 4.

the length of time these rafts had been utilized in India. However, both seemed to assume that they were very old. Such an assumption certainly is not unusual for Hornell. One controversial aspect of his methodology was his tendency to treat the primitive watercraft used by native peoples in modern times as replicas of those employed in the past. The motivation for this approach was his idea that watercraft changed very slowly over the centuries. While this is not an unwarranted view for watercraft in general, its reliability is questionable on a case to case basis. One result of this approach and these ideas was the assumption that because a primitive watercraft was in use among a primitive people it was old. Age appears to have been injected into the Indian rafts in this way.

Although the validity and accuracy of this approach can be questioned, it may give a reasonable result in this case. The Indian rafts do seem to be quite conservative. A comparison of Edye's description of 1834 with Hornell's observations in the 1920's and 1930's reveals little change in them implying that they may well be part of an ancient maritime tradition.

More important is the fact that they are used in Ceylon and the extreme south of India, an area which must be considered as one of the remote corners of the world. Like Tasmania and Tierra del Fuego it is an end point for human migration, and therefore has gathered and kept very ancient and retrograde peoples who exhibit a low level of cultural development. In such areas and among such peoples have been preserved exceedingly ancient ways of doing things.

Hornell suggests that the Indian rafts are part of the Tamil culture.<sup>94</sup> To equate this craft with these aborigines is to imbue them with great antiquity. However, in the last analysis, we have only a feeling of age for the rafts and no idea exactly when the Tamil acquired them. Perhaps it was long after their first coming to India. On the other hand, they may have acquired them early from some ancient group of predecessors.

#### *Arabia-Abyssinia-the Red Sea and Europe*

Very few references are available concerning the use of shaped rafts in these areas. According to Bowen, in 1862 log canoes having the catamaran construction of the Malabar Coast were employed on the Musandam Peninsula,<sup>95</sup> that point of land which stretches between the Persian Gulf and the Gulf of Oman. Small rafts built of two or three thin logs lashed together with a grass rope were propelled, with the aid of the

<sup>94</sup> Hornell, op. cit., *Water Transport*, p. 62.

<sup>95</sup> R. L. Bowen, 'Primitive Watercraft of Arabia,' *THE AMERICAN NEPTUNE*, XII (1952), 7-8.



double-bladed paddle, several miles out to sea to fish. Apparently these persisted in use into the present century.

A raft consisting of five logs, and equipped with upward-bending bow and double paddles is recorded near Massawa, a town at the southern end of the Red Sea.<sup>96</sup> This appears to have been observed in the nineteenth century. Bowen says that somewhat different rafts, built of three or four logs, fished the same area in this century.<sup>97</sup>

The Danakils of Abyssinia used what at first glance seems to be a pertinent type of raft, chiefly for pearling in their coast fishery. This was made of five tree stems and was said to resemble an ambatch raft of Nubia.<sup>98</sup> The ambatch, a spongy wood of no great thickness, apparently was bound to form bundles comparable in size to the tree trunks used in the log rafts. This raft is regarded as not being of the log balsa line. Indeed Ratzel's illustration suggests that it is closer to the reed balsa (Plate 15 lower).

The Mediterranean and Europe are very far from Peru and consequently are of relatively little significance to us. Moreover, there is little evidence for the use of shaped rafts in this huge region. A raft of three palm tree logs apparently was used in modern times in coastal Sicily,<sup>99</sup> but we do not know how long it has been there. It could very well be a recent introduction, perhaps a result of the Islamic invasions in the eighth century or so.

#### Discussion

Excluding the Abyssinian raft there is little doubt that the Arabian and African rafts originated in India, as Bowen has suggested.<sup>100</sup> The idea of Indian influence in Arabia as well as Africa is reasonable on natural grounds. Winds and ocean currents<sup>101</sup> are both favorable to drift from India to these two areas in the winter months. The reverse is true for the summer.

The tale told by Brindley in his note *Nautical Exhibits in South African Museums*, if correct, is very dramatic testimony to the effectiveness of these natural factors. He refers to a 'treasure' which he found in the Port Elizabeth Museum in South Africa.

<sup>96</sup> Suder, op. cit., p. 85.

<sup>97</sup> Bowen, op. cit., pp. 7-8.

<sup>98</sup> F. Ratzel, *The History of Mankind* (London, 1898), III, 375.

<sup>99</sup> Suder, op. cit., p. 85.

<sup>100</sup> Bowen, op. cit., p. 8.

<sup>101</sup> See *Atlas of the Climatic Chart of the Oceans* (Washington: Weather Bureau, U. S. Department of Agriculture, 1938), Charts 15, 16, 24 and 25. The currents are shown in H. U. Sverdrup, M. W. Johnson, and R. H. Fleming, *The Oceans: Their Physics, Chemistry and General Biology* (New York, 1946), Chart VII.

This is the Indomalayan dug out canoe, 32 x 2 ft., which came ashore in Algoa Bay in 1927 after drifting across the Indian Ocean in the Malabar Current.<sup>102</sup>

Algoa Bay is located about four hundred and twenty miles east of Cape Town on the southern coast of South Africa. Exactly which part of the complex current system of the Arabian Sea is meant by Malabar Current is not clear. Chart VII in Sverdrup *et al.* shows a surface circulation in February and March which could convey this canoe from India or Malaya by a very long and devious route to South Africa. However such a journey is so awe inspiring that one cannot help but feel some doubt at Brindley's interpretation of this Algoa Bay find.

Less doubtful but equally as dramatic are the voyages of Annius Plukamus. At about the time of Christ this man was a collector of tribute for Rome. While engaged in this exacting pursuit somewhere along the Southern Arabian coast he was caught by the monsoon and wafted to the island of Ceylon.<sup>103</sup> This must have occurred in the summer months. Later, undoubtedly during the winter, he was carried back to Arabia in the company of some natives sent to serve as ambassadors to Rome by the rulers of the island. Vincent, the narrator of this story, presented it along with other material in order to demonstrate that the native peoples dwelling about the Arabian Sea had been aware of the navigational values of the seasonal changes in the monsoon long before the arrival of the Europeans.

That the alternation of the monsoon was used for navigational purposes by the dwellers about the Arabian Sea long before the Roman Era is certain. What is uncertain is just how long before. Edkins has stated that these voyages may have continued from the time when Ur was a great city, about 2300 B.C., down to the period of the Persian Empire, when Babylon began to decline. He believed that during all this period, as afterwards, the navigators of the Indian Ocean, be they Babylonian, Arabian, Phoenician, or Egyptian, were trading, with the aid of the monsoons, along the African and Asiatic coasts, and carrying knowledge from one country to another.<sup>104</sup>

This date may or may not be correct so far as deliberate voyages for commercial purposes are concerned, but accidental drifts from India to Arabia and East Africa, and vice versa, very probably have been occurring since appreciably earlier periods. In fact, they are expectable as far

<sup>102</sup> Brindley, *op. cit.* (1930), p. 286.

<sup>103</sup> W. Vincent, *The Commerce and Navigation of the Ancients in the Indian Ocean* (London, 1807), II, 47.

<sup>104</sup> J. Edkins, 'Ancient Navigation in the Indian Ocean,' *Journal of the Royal Asiatic Society*, XVIII (1886), 1.

back as man's first use of seaworthy primitive rafts and other watercraft in these areas. It is by this means that the shaped log raft probably was carried from India to the surrounding coasts; at what time level it is impossible to say for we have no direct dating for the shaped raft anywhere in this region. India is preferred as the area from which diffusion occurred primarily because the marked variety of shaped rafts used there suggests it is a source region.

### *The Pacific*

On the western side of the Pacific shaped odd-log rafts are recorded for many parts of Melanesia. In eastern Polynesia similar craft were used in the Marquesas and the Tuamotu Archipelago. Between these two regions is an area dominated by various kinds of bamboo rafts; however, a raft somewhat like the Mangarevan type is known for the island of Tonga (Plate 18 lower).

#### *Western Pacific*

Brindley depicts a model of the *konga* (Plate 17 upper) obtained from Eddystone Island in the Solomons Group in 1909.<sup>105</sup> The shaped, odd-log arrangement is evident both fore and aft. Some longitudinal sheer is present toward the sides of the craft. Binding of the log apparently is always accomplished by pinning rather than lashing.

Similar rafts were observed in the northwest Solomons in 1898. These were composed of three to four tree trunks, pointed at both ends and pegged with hard wooden pins. Fishing on the reefs and small trade seem to have been their major functions.<sup>106</sup>

Less information is available for comparable rafts of the surrounding islands. Rafts of the Telei tribes, South Bougainville, apparently consist of five logs, the longest in the middle and decreasing in size laterally.<sup>107</sup> On the east coast of Buka, an island just north of Bougainville, rather elaborate rafts are constructed of four squared timbers pointed at both ends and linked by three pegs driven into their adjoining sides.<sup>108</sup> Rafts of Tabar Island, north of New Guinea, also consist of three or five bamboo poles, of which the central is the longest. These are strengthened by three or four crossbars.<sup>109</sup>

Haddon and Hornell have summarized a number of references to sig-

<sup>105</sup> H. H. Brindley, 'A Solomon Island's Catamaran,' *The Mariner's Mirror*, XII (1926), 444-445.

<sup>106</sup> A. C. Haddon, *The Canoes of Melanesia, Queensland and New Guinea* (Honolulu: Bernice P. Bishop Special Publication No. 28, 1937), p. 114.

<sup>107</sup> *Ibid.*, p. 114.

<sup>108</sup> *Ibid.*, p. 116.

<sup>109</sup> *Ibid.*, p. 137.

nificant rafts in southeastern New Guinea and adjacent islands. As they see it,

Macgillivray has given the best description of them. 'The small ones at Brumer Island consist of three logs or planks lashed together; the central one is longest and may be slightly curved and colored at the ends. A common length is about 9 feet; others capable of carrying a dozen people with their effects are much larger.'<sup>110</sup>

Plate 17, lower, shows the unusually intriguing shaped raft of the Tanga, the Melanesian inhabitants of the island group of the same name located east of New Ireland. Of the three types of watercraft used by them in the 1940's this was the least valued, being relatively simple to build; although this was always done to a fixed design. Bell, a student of the industrial arts among these people, has provided detail on the construction and structure of the raft.<sup>111</sup>

Notice that the raft is built of bamboo, for this shows that the shaped raft idea was perfectly suitable to this kind of wood. In addition, it demonstrates that bamboo will not consistently orient a boatbuilder to the lashed, streamlined prow of Heine-Geldern's Indo-Chinese raft, nor to the sharply upcurved bow of the Formosan type.

Little information is available on any of these Melanesian rafts for the centuries prior to the nineteenth. Moreover, it has been said that some of them may be recent introductions. In 1946 Hornell wrote that:

In Central New Ireland, rafts (rama) are taking the place of the fast-disappearing canoe. In the Panakondo-Lambusso district these are the true catamaran type, consisting of five arm-thick logs instead of the more usual bamboos. The central log is longest, the lateral ones decreasing progressively as in the Indian type; from this, however, they differ in being pointed at each end. Rattan bands, passed through seven holes bored through the logs transversely, bind them securely together.<sup>112</sup>

Hornell suggests that these craft and others like them may be used as a result of recent Malay influence in these islands.<sup>113</sup>

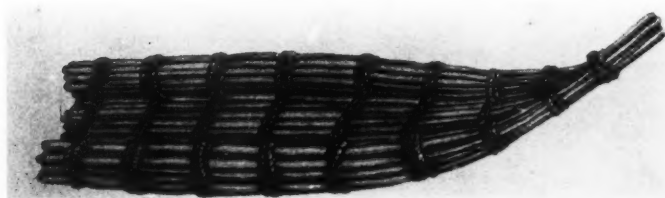
Yet there is little reason to doubt that the shaped raft is old in this area. Their widespread distribution suggests that they may have been part of the early culture of the Melanesians, ancient settlers of these islands. Then too the Tanga apparently had little, if any, contact even with surrounding Melanesians prior to 1933, so that their raft may well be an integral part of their aboriginal culture. Tradition also suggests

<sup>110</sup> Ibid., p. 241. This text goes on to note the presence of very similar craft at many other localities within the same region.

<sup>111</sup> See F. L. S. Bell, 'The Industrial Arts Among the Tanga,' *Oceania*, XIX (1949), 208-210.

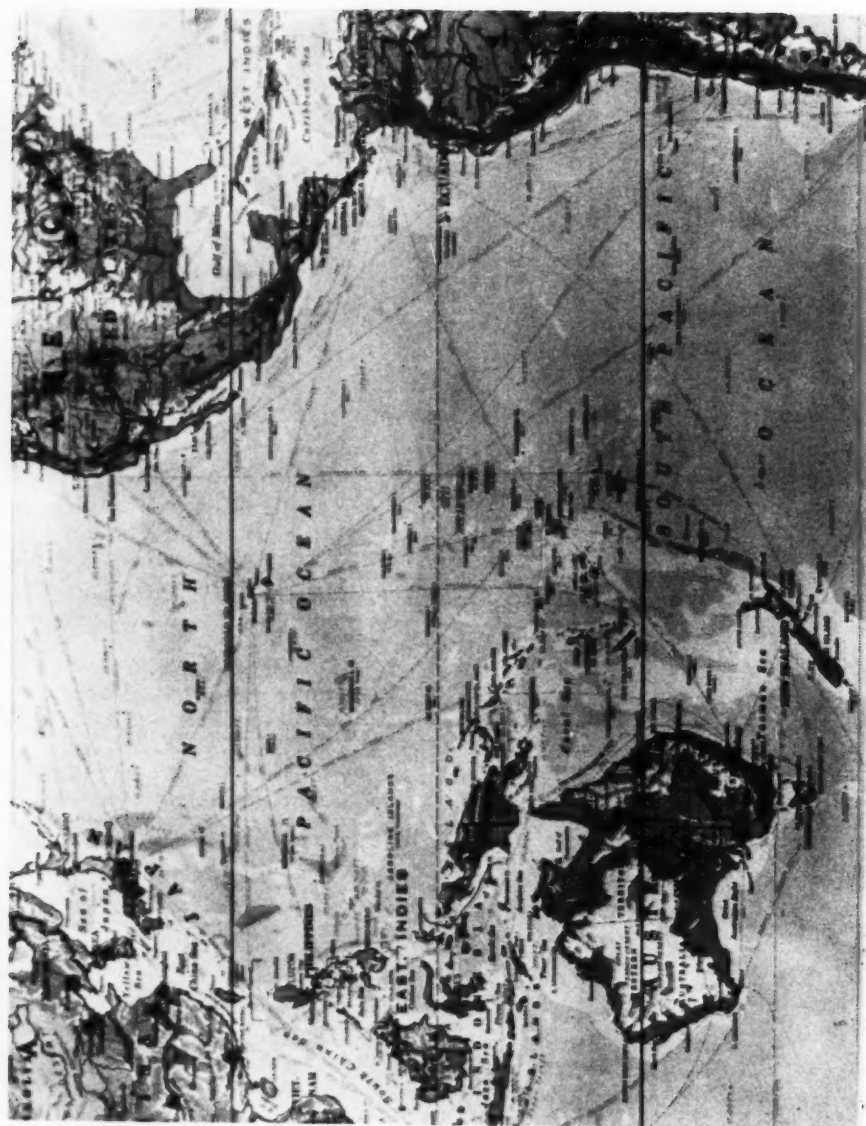
<sup>112</sup> Hornell, *op. cit.*, *Water Transport*, p. 73.

<sup>113</sup> Ibid., p. 74.

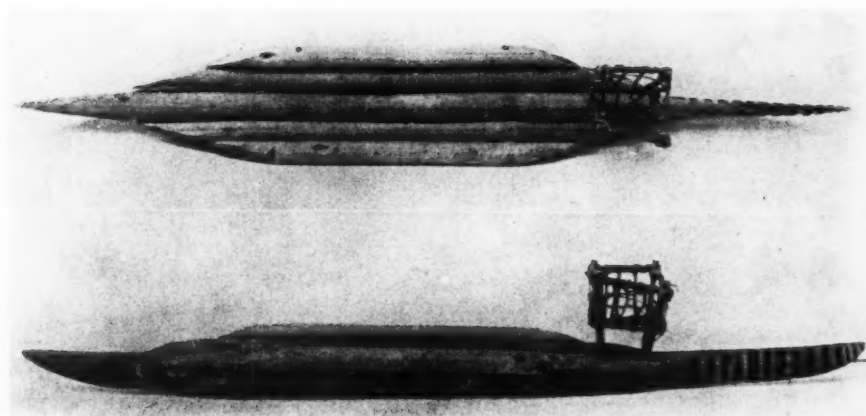


*Upper:* Area in which various shaped log rafts are used in India, adapted from Suder 1930 and Hornell 1940. *Middle:* Two shaped log rafts of India as illustrated by Hornell 1920. *Lower:* An ambatch-raft from the Nile, after Ratzel 1898

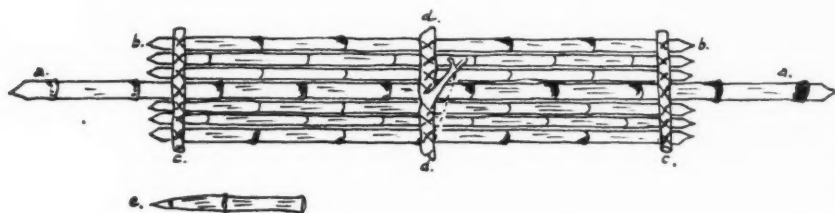




Index map of the Pacific



Log raft or *konga* of Eddystone Island, Solomon Islands, from Hornell 1946



Plan view of the bamboo raft of the Tanga  
A split bamboo paddle is also shown. After Bell 1949



The shaped log raft of Mangareva as seen by Beechey early in the nineteenth century. After Heyerdahl 1952



A Tongan sea-going double canoe, from Hornell 1936

age. Thus Bell was told that a supernatural being, Kabutraï, who inhabited the island before the coming of man had built the first raft.<sup>114</sup> If the phrase 'coming of man' refers to the arrival of the Melanesians then this tale could indicate that they got the raft from their predecessors on the island. The age of the raft in this case depends upon the date of the initial settlement. This we do not know, but if it compares to Melanesian infiltration into the islands as a whole it is some thousands of years.<sup>115</sup>

#### *Eastern Polynesia*

The shaped raft formerly used on Mangareva Island in the Tuamotus ranks among the best-known primitive watercraft of the eastern Pacific (Plate 18 upper). The English voyager, Beechey, apparently was the first European to observe it in action. As his ship, *Blossom*, approached the island in 1825, he and his crew saw several strange and fascinating rafts, each carrying from sixteen to twenty men. At times they moved together to form one large platform holding about one hundred persons. But otherwise the rafts moved about on independent courses, driven by paddles and mat sails.<sup>116</sup>

To examine Beechey's illustration of these rafts is to understand why their structure is obscure. As Hornell interpreted it they were constructed of what seemed to be five or seven logs, an odd number then, as in India. He stated that,

The fore ends are pointed or rather wedge-shaped; logs in the centre project somewhat farther than those of the more lateral, the median one being the longest. The after end is truncate, the logs finishing level with one another. Two cross beams, one toward each end, are lashed across the basal fore-and-aft logs.<sup>117</sup>

A small raft also was used on Mangareva. It seems to have been observed for the first time in 1837. Heyerdahl says it was constructed of three tree trunks lashed together by crosspieces and was used for fishing.<sup>118</sup> It is quite possible that this too had a shaped form, but we have no proof of this.

The large Mangarevan raft stands alone among the watercraft of the Pacific; nowhere in the literature is there a description of a raft comparable to it in size. However, some references are made to similar craft larger than or comparable to the small fishing raft of the island.

<sup>114</sup> Bell, op. cit., p. 208.

<sup>115</sup> Bell interprets the evidence as indicating this raft is a recent development. See Bell, op. cit., p. 209 in footnote.

<sup>116</sup> Hornell, op. cit. (1936), p. 93.

<sup>117</sup> Ibid., p. 94.

<sup>118</sup> Heyerdahl, op. cit., *American Indians in the Pacific*, pp. 576-577.

One has been observed in recent times on the island of Nuku Hiva, in the Marquesas. As Hornell describes it,

A Catamaran seen on a stream in the historic Taipa Valley in 1925 consisted of three long log banana stems pegged together with hardwood rods, passed from side to side. The fore end was cut to a sharp wedge point by long sloped cuts from each side. The after end was truncate. A box formed a seat, and the little craft was propelled by an oar shaped paddle.<sup>119</sup>

Rafts such as these may date from an early period in island history. Hornell has linked them suggestively with the rafts so poorly described by Porter and Quiros in 1822 and 1595.<sup>120</sup>

#### *Central Polynesia*

Shaped rafts were described for Hornell by natives of Tonga Island. His account, which relies, for the most part on the remarks of just one native, follows:

He describes it as a shaped raft with side logs boomed out after the fashion of a double outrigger. He states that his father told him he had seen a small one made of three logs; the median one was longer than the two lateral ones, which were separated from the median by a space, the whole being kept in position by several poles (*hiato*) laid athwart the three logs and lashed thereto. In larger examples it is said there was more than one log on each side. Probably as more logs were employed the space between the central log and the original two lateral ones would be filled in. The timber used in construction may have been that of the breadfruit trees (*mei*). Havea says that these rafts had some sort of a raised platform on which the crew and passengers sat. They were propelled by paddles, or sometimes by means of a sail. According to some of the old people these rafts were used for journeys between Tonga and Samoa. . . .<sup>121</sup>

The area of critical interest on this raft is the space between the logs. If this was large then the raft was not in the shaped category. Instead it would be closer to a curious craft sometimes known as *amatasi*. These are little more than a large central log fitted with an outrigger.

Hornell seemed to consider this unlikely. His inclination was to make this a large raft, as is evident in his suggestion that when more than three logs were employed the space between the logs would be filled. This seems reasonable; first, because three logs were relatively rare in the *amatasi* line; second, there are no known references to such craft having more than one log on either side; finally, the presence of a platform, paddles and sails definitely point towards the large shaped raft.

<sup>119</sup> Hornell, op. cit. (1936), p. 48.

<sup>120</sup> Hornell, op. cit., *Water Transport*, p. 79.

<sup>121</sup> Hornell, op. cit. (1936), p. 273.



The nature of the evidence makes one hesitate to be dogmatic about the presence of the shaped raft on Tonga. Yet Hornell undoubtedly was aware of the problems involved, and he concluded that the evidence indicates the former existence of a Tongan sea craft akin to or perhaps identical with the sailing catamaran of Mangareva.<sup>122</sup>

#### Discussion

The Melanesian rafts resemble the Indian types very much. Thus, Brindley thought the *periya maram* was the nearest parallel to the *konga* of the Solomons. Both possess a beak-like or pointed prow, have side logs shorter than the median, and are sheered. But, unlike the *konga*, the *periya maram* has not one, but two long central logs. In addition it is not so smooth at the stern, and the logs are lashed, not pinned together. However, these differences must be looked on as unimportant. In fact they all but disappear when the *konga* is compared to other, similar Indian rafts. Thus both the *irruka* and *thundil maram* have one median log. Use of wooden pins also was known in the Indian rafts.

Hornell was inclined to the view that the similarities in the rafts of these two areas came about as a result of early migrations from India.<sup>123</sup> However the lack of direct and definite dating for either the Melanesian or Indian rafts makes it difficult to be positive about such an origin. It may be that the rafts spread from a centrally located area such as Indonesia. Unfortunately this is an empty area so far as information on shaped rafts is concerned, although some data may be available in the personally inaccessible Dutch.

Scattered among the thousands of miles of island and ocean stretching east of Melanesia are the Tongan, Marquesan and Mangarevan shaped rafts. Hornell has suggested that the Mangarevan raft is

... in reality the vestigial survivor of a higher type of craft closely related to and probably identical with the old type of double canoes of Tonga and Samoa. If the two raft hulls of these craft were discarded and the sail area reduced, the Mangarevan type of raft would represent the decking of the original double canoe.<sup>124</sup>

Such an origin for the Mangarevan raft is considered unacceptable. Plate 10 lower, portrays a large seagoing Tongan canoe. Its platform is composed of numerous planks or bamboos, not at all comparable to the five- or seven-log hull previously described by Hornell for the raft of Mangareva.

<sup>122</sup> Ibid., p. 274.

<sup>123</sup> Hornell, op. cit., *Water Transport*, pp. 76-77.

<sup>124</sup> Ibid., p. 77.

Such a drastic change in style is difficult to accept. It involves a complete transformation from a crude, multiplanked flat structure to a shaped raft constructed of relatively few logs in the odd-log fashion. Perhaps the idea is valid, but hardly as a result of chance; far better to view it as the reconstruction of a shaped raft once in greater use on the island.

If the distribution of shaped rafts itself is any criterion, the idea for such a craft could have reached Mangareva, as well as Tonga and the Marquesas, from either the west or the east, i.e., from Melanesia and India or from the South American coast. And like other elements common to Polynesia, the Old World and the Americas, it has become involved in the controversy over the origin and development of Polynesian culture. Nothing could be more devastating than a deviation into the voluminous literature on this problem. A brief résumé will have to do.

Weckler has published a small work entitled *Polynesians, Explorers of the Pacific*,<sup>125</sup> which is representative of the ideas of those who visualize the tall caucasoid-like Polynesians coming into the Pacific from the west. Navigational, mythological, botanical and other materials are treated to show that their great seagoing canoes probably paddled the Micronesia routeway into the central Pacific. This approach seems to be favored primarily because of the paucity of Polynesian racial characteristics among the short, dark inhabitants of Melanesia, the alternative gateway to Polynesia. Not that Micronesia has no disadvantages. Passage through this area, dominated as it is by low-lying infertile atolls, very probably would result in the loss of many arts known to have been present in aboriginal Polynesia: among them foods such as the yam, the sweet potato, the banana; and textiles such as tapa or bark cloth. The 'westophiles' have argued that these losses could be circumvented either by fast passage through this island filter, or by subsequent recovery of the lost arts through contact with Melanesia once Polynesia was reached.

The other major school of thought is represented by Heyerdahl. He regards the above explanations as unsatisfactory and turns to South America and the northwest coast of North America to explain the caucasoid racial traits, as well as many aspects of and absences in the culture of Polynesia.<sup>126</sup>

The shaped odd-log raft has been used by him as both means and evidence for American influence in the Pacific. His voyage on *Kon-Tiki* was a courageous test of the feasibility of pre-historic voyages in such rafts

<sup>125</sup> J. E. Weckler, *Polynesians, Explorers of the Pacific* (Washington: Smithsonian Institute, War Background Study No. 6, 1943).

<sup>126</sup> See especially Heyerdahl, *American Indians in the Pacific*, op. cit.

from Peru to Polynesia.<sup>127</sup> This trip was made with the strong steady southeast trade winds and the Peru and South Equatorial currents at his back.

The practicability of such east to west drifts previously had been supported by Hornell who cited two cases in which derelicts drifted from western South America far into the Pacific.<sup>128</sup> The most impressive of these was calculated as covering some 5000 to 5500 miles in 170 days before running aground on Mopeha Island, near Raiatea, in the Society Islands. In 1958 the adventurer de Bisschops and four companions set out from Callao on a somewhat different raft. After many difficulties and about 138 days at sea they came ashore at Rakahanga, an island north of the Cook Group, many hundreds of miles beyond Heyerdahl's landing place. During the coming-ashore de Bisschops was killed, but the other four survived.<sup>129</sup> This evidence leaves little doubt that other rafts conceivably could have made such voyages in the past.

Moreover present chronology favors introduction from the east, for the raft is dated much earlier in Peru than in the Pacific. As has been stated previously archaeological dating indicates that the shaped raft definitely is at least one thousand years old in Peru and Chile. But no direct evidence comparable to this is available for the Pacific shaped raft. The radio-carbon dates which recently have been made in this area,<sup>130</sup> aside from demonstrating that Polynesian entrance into the Pacific was much earlier than the formerly accepted figure of A.D. 500, are of no aid in dating specific kinds of watercraft. Consequently, only the less reliable and indirect dating devices, such as myths, are available to suggest antiquity for the shaped rafts of the Pacific.

Can we then eliminate any idea that the shaped rafts of the Pacific came out of the west? The Tonga raft is hundreds of miles from Melanesia and additional hundreds of miles beyond this are the Mangareva rafts.

Despite these chronological and distributional problems the idea that the Mangarevan, Marquesan and Tongan rafts might have spread from Melanesia will not down. There seems to be ample physical basis for westward drift of such rafts over any part of the Central and South Pa-

<sup>127</sup> Heyerdahl, *op. cit.* (1959), pp. 23-25.

<sup>128</sup> J. Hornell, 'Was There a Pre-Columbian Contact Between the People of Oceania and South America,' *Journal of Polynesian Society*, LIV (1945), 183-185.

<sup>129</sup> C. Boswell, 'The Last Long Voyage,' *Argosy*, Feb. (1959), p. 90.

<sup>130</sup> See for example H. de Vries and H. T. Waterbolle, 'Groningen Radiocarbon Dates III,' *Science*, CXXVIII (1958), 1550-1556; and H. P. Crane and J. B. Griffin, 'University of Michigan Radiocarbon Dates II' and 'III,' *Science*, CXXVII, 1098-1105 and 17-23 respectively.

cific. And Heyerdahl's epic voyage and the drifts recorded by scholars like Heine-Geldern, Sharp and Best demonstrate man's ability to survive on fish and rain for many months at sea.

Heine-Geldern's work was motivated by a desire to refute the argument that steady westward movement of the trades and ocean currents made easterly migration in much of the Pacific difficult if not impossible. He cites instances of involuntary drift voyages from west to east in Micronesia and Polynesia. In addition he advances evidence of westerly winds in both areas.<sup>131</sup>

Several of Cook's observations on the Tahiti area are quoted. The most interesting of these reads as follows:

In those months, when the sun is nearly vertical, that is, in December and January, the winds and weather are both very variable; but it frequently blows from West North West, or North West. This wind is what they call the Toerou; and is generally attended by dark, cloudy weather, and frequently by rain. It sometimes blows strong, though generally moderate: but seldom lasts longer than five or six days without interruption; and is the only wind in which the people of the islands to the leeward come to this (i.e. Tahiti) in their canoes. . . .<sup>132</sup>

Additional references to westerly winds also are made by Hobbs in his study of the fortress islands of the Pacific. Rapa, an island in the Austral Group, at a latitude of 27° 36' S., is said to have prevailing westerly winds. Santa Cruz Island (11° S., 166° E.) is characterized by calms from November through March, with some spells of heavy northwest winds for weeks at a time.<sup>133</sup> Calms and westerlies also are reported for the Marshalls from May to December.<sup>134</sup>

There appear to be several possible meteorological explanations for such west winds. Some may be related to the series of anticyclones which Watts describes as crossing Australia and the southwest Pacific throughout the year. A trough of low pressure accompanies each pair and with its associated cold fronts helps to maintain a fairly permanent line of disturbed weather south of the equator and east of 170° E. which is sometimes called the Polar Front.<sup>135</sup>

In addition to these disturbances, tracks of tropical cyclones pass through the southern Pacific, as Hobbs has shown.<sup>136</sup> Any westerlies as-

<sup>131</sup> R. Heine-Geldern, 'Some Problems of Migration in the Pacific,' *Kulture und Sprache*, Institute für Völkerkunde, Der Universität Wien, IX (1952), 313-362.

<sup>132</sup> *Ibid.*, pp. 317-318.

<sup>133</sup> W. H. Hobbs, *The Fortress Islands of the Pacific* (Ann Arbor, 1945), pp. 47-48.

<sup>134</sup> *Ibid.*, p. 67.

<sup>135</sup> I. E. M. Watts, *Equatorial Weather* (London, 1955), pp. 195-196.

<sup>136</sup> Hobbs, *op. cit.*, p. 53.

sociated with these storms would seem to constitute a valid cause for easterly drift. Garbell's illustration of the wind circulation about the permanent high-pressure cell located in the eastern Pacific suggests that once carried as far as the Tuamotu Islands (140° E.) a ship could be wafted south and east to the west coast of South America.<sup>137</sup> In this zone the easterly movement of the Eastern Pacific Wind and current systems begins. The position, direction, constancy and force of the surface winds might not be as favorable as Garbell indicates. But, in the months of June, July, and August westerly winds seem to begin about 140° E. and 37° or 38° S. and blow towards the American west coast at roughly fifteen miles per hour, about sixty per cent of the time.<sup>138</sup> These merge to the south with the stronger more constant zone of westerly winds, 'The Roaring Forties.'

Sharp was consumed with the idea that the Pacific was peopled, not by navigational brilliance and long deliberate voyages, but by frequent and accidental drifts. In his very able presentation of this thesis he has cited evidence to show that involuntary migrations took place in all directions. As he saw them,

The recorded facts give direct proof that all the vital links in that chain (the central belt of Polynesian Islands)<sup>139</sup> could be and were crossed. Dillon found accidental voyages from Rotuma in Samoa (a west to east journey of some 500 to 600 miles) and commented on the fact that westerly and northwesterly winds blew in that area, giving a specific instance where a ship was blown from near the equator in the western Pacific to Samoa. Gill recorded that 'a numerous family' had come to eastern Polynesia by an accidental voyage in the season when the westerlies blew. Beechey found twenty men, women, and children who were established on unknown Tuamotuan islands after being driven over 500 miles to the east by two successive westerlies.<sup>140</sup>

Best's is the classical early work on the voyages of the Polynesians. This scholar contends that the islands were settled from the west by both deliberate and accidental voyages. According to him the deliberate voyages were motivated by many things: the desire to explore and find a more fertile homeland; the search for adventure and prestige; and to escape from war and quarrel.<sup>141</sup>

One of the most impressive indications that the people of the Pacific

<sup>137</sup> M. A. Garbell, *Tropical and Equatorial Meteorology* (Chicago, 1947), p. 131.

<sup>138</sup> Atlas of Climatic Charts of Oceans, op. cit., Charts 5, 8, 9 and 10.

<sup>139</sup> My italics.

<sup>140</sup> A. Sharp, *Ancient Voyagers in the Pacific* (Harmondsworth-Middlesex: Pelican Books, 1957), pp. 88-89.

<sup>141</sup> Best, op. cit. (1954), pp. 11-14.



knew the intricacies and vagaries of the winds and used them is given by Best. He has discussed the find of a large double canoe on an island in the Societies. The vessel

... contained ten men and four or five women who had come from an isle in the Paumotu Group, several hundred miles to the eastward, in search of a party that had been blown to sea some time before. The seekers of the drift party had visited many islands, including Huahine and Raiatea (Rangiateain, N. Z. Maori) without gaining tidings of the lost ones; and were now on their way home again. They were waiting in this place for a fair wind. Six months later this party was seen in the same place, still waiting for a westerly wind. Eventually the wind changed and the party set sail for the Paumotu Isles. From October to December some two or three weeks of westerly wind may be expected in these parts, but occasionally the easterly winds blow throughout the year, save some squalls of a few hours duration.<sup>142</sup>

Evidence on voyages out from the Polynesian area along the southern edge of the east Pacific anticyclone is very scarce. Bowen has noted that Dr. Thomas Davis crossed this southern route in a 48-foot ketch from New Zealand to Peru during the winter of 1952. This was interpreted as evidence that the enormously seaworthy raft could do the same thing.<sup>143</sup>

De Bisschops attempted a west to east voyage by raft from Tahiti to North America in 1956. Apparently this raft was made of bamboo, balsa and coconut hemp. It sailed from Tahiti on 28 October and for seven months moved slowly towards South America, almost reaching Juan Hernandez, an island five hundred miles from the South American coast, before breaking up in a typhoon.<sup>144</sup> Although such a trip would not be accomplished easily, the thousands of miles negotiated by the raft suggest that in the past such drifts reached South America.

The record therefore demonstrates that west to east drifts anywhere within the zone from Melanesia to South America seemingly are inevitable over a long period of time. Thus the fragmented distribution of shaped rafts across the Pacific definitely could represent a few late survivals of ancient migrations from that raft-rich area. The broken texture of the distribution possibly indicates that the numbers involved in these voyages have been relatively small, or that the late influx of other peoples has disturbed and obscured the pre-existing watercraft mosaic.

This implies that the Polynesians need not have been the bringers of the raft; a suggestion borne out by the little use they made of it. Perhaps it was the tool of their predecessors in the Pacific. Polynesian myths and

<sup>142</sup> Ibid., p. 22.

<sup>143</sup> Bowen, *op. cit.* (1953), p. 104.

<sup>144</sup> E. de Bisschops, *Tahiti Nui* (New York, 1959).

traditions indicate widespread contact with such a people or peoples, whom they termed the Manahune.

Buck found record of these folk in the mythology of Hawaii, the Societies and Samoa. Nothing of value to this study can be gained from intensive speculation about their racial affinities and their origins. For although these imply a dwarfish people they also state that the Manahune were derived from worms.<sup>145</sup>

The Manahune legends are of interest only because they indicate the presence of primitive peoples in Polynesia prior to the arrival of the Polynesians. That some of these people came out of the west, using the shaped odd-log raft, or bringing the idea with them, is quite possible.

In fact the period of time in which drifts from New Guinea to Melanesia and beyond might have been taking place could reach back to the Pleistocene. For among the Australoid skulls recovered in New Guinea is a reliable find located by an Australian geologist in the Aitope district, northern New Guinea.<sup>146</sup>

The idea that the shaped raft was distributed across the Pacific as a result of long-continued, accidental drifts must however be considered as no more than a possibility; primarily because we have no certain basis for linking the shaped raft with any early peoples of the Pacific. However the idea is preferred by the author because it seems to explain more than any others advanced so far. Thus it is reasonable to assume that the shaped raft could come into the eastern Pacific from Peru as Heyerdahl has shown. But such movements are not appealing explanation for the distribution of similar shaped rafts farther west, as in Melanesia, India and Arabia. It seems better to visualize any South American contact with the islands of the eastern Pacific by means of log balsas as the return of a raft that originally went in the other direction. This must be so because in the light of the evidence presented in this paper it is no longer possible to attribute the use of the log balsa in South America to an ancient migration via some northern route.

There is another major alternative; that the shaped log balsa was invented more than once. To postulate two inventions, one in India and the other in Peru, with the subsequent spread of the raft to Arabia and the western Pacific on the one hand, and surrounding sections of the Americas and the eastern Pacific on the other, also would account for the distribution. Several facts could be used to support this idea. First is the small number of observations of shaped, balsalike rafts recorded for the

<sup>145</sup> P. Buck, *Vikings of the Sunrise* (New York, 1941), p. 59.

<sup>146</sup> F. D. McCarthy, 'The Antiquity of Man in Australia,' *The Australian Museum Magazine*, IX (1948), 220-226.

central Pacific. Second, it is possible to question the similarity of the Tonga raft to the log balsa. Third, nearly all the descriptions of the raft for Polynesian waters are comparatively recent ones. If, on the basis of this evidence, anyone were to refuse to accept the idea that the log balsa is pre-European in the Pacific and then were to point to the gap thus created between the Indian-Melanesian rafts and their American counterparts as support for a personal belief in independent invention probably no one would be greatly surprised.

Nevertheless, although possible, this idea of independent invention personally is difficult to accept. When the global pattern of the shaped odd-log balsa is visualized great empty gaps appear. Why is no such raft found in all of Siberia, huge sections of Southern Asia, most of North America, all of Australia, New Zealand and so on? Log rafts were used in many of these regions; some in Korea even possessed the odd-log hull, but they did not exhibit the long center log and shaping typical of the Peruvian raft. We can conclude therefore that the shaping of this raft does not streamline it to the extent that this is recognized and exploited consistently by primitive peoples; or, if the streamlining does improve the rafts' performance, that this is not recognized consistently by raft-using peoples. Moreover, it is possible to support the idea that these shaped rafts may have been used on traditional rather than on utilitarian grounds. Remember the raft of the Tanga. There is very little likelihood that the one long log which pointed or shaped the prow of this craft had any significant effect on its performance. On the contrary it is possible that the shape of the raft is a vestigial element indicating a more ideal relationship with the shaped log raft sometime in the past. As a final argument it would be a coincidence indeed if the only areas in which the raft was independently invented should constitute a broken, but continuous pattern stretching from Arabia through India, Melanesia, and the Pacific to the Americas.

These then are the reasons for a personal preference for the idea that the distribution of the shaped log balsas is the expression of a single invention, possibly made in India, and diffused by accidental voyages and other means since very ancient times. However when looked at coldly and objectively there is nothing close to a concrete answer to the problem of the balsa. The nature of the evidences precludes this. Perishability and other dating difficulties associated with primitive watercraft make the chronology of the balsa continuously uncertain. Further studies of the distribution of various other elements associated with the balsa seems to constitute the best approach to a solution. This Bowen has tried to

some extent and has drawn conclusions close to those preferred in this paper.<sup>147</sup> He considered the use of similar sails and the centerboard on the shaped log rafts of India and Peru as a complex impossible of coincidence. Even so this once again is a matter of belief and nothing more. Others would have no difficulty visualizing the complex as due to several independent inventions. In conclusion then it is possible to present a solution to the problem of the origin of the balsa, but only in terms of the beliefs of the individuals concerned.

<sup>147</sup> See Bowen, *op. cit.* (1953), Pt. I, 108 especially, but also 101-113.

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## *Postscript to the Voyages of La Pérouse*

*An expedition sent to the island of Vanikoro from  
15 to 25 March 1958, finds the wreckage  
of La Pérouse's ship Astrolabe*

BY PIERRE ANTHONIOZ

THE quest for fresh information or evidence regarding the circumstances in which the Count of La Pérouse was shipwrecked in 1788 on the outer reefs of the island of Vanikoro (Santa Cruz Group) has always greatly aroused the interest of seafarers in the region of the New Hebrides and the Solomon Islands.

Deep mystery for a long time surrounded the practically simultaneous shipwrecks of the two half-armed frigates *Astrolabe* and *Boussole* as no survivor of the expedition was ever found and the natives of Santa Cruz maintained an excusable silence regarding the circumstances in which the French mariners had been killed, eaten, or else kept prisoners for years.

The expedition of La Pérouse was, moreover, a scientific expedition of the first importance which had been fitted out with extreme care and of which the results could have been comparable to those of the famous voyages of Captain Cook.

The two ships sailed from Brest on 1 August 1785, and after calling at Brazil and Chile visited Easter Island and Hawaii. They then carried out a detailed exploration of the west coast of North America which, according to the orders given by Fleurieu, was the principal object of the expedition.

When this task had been completed La Pérouse set sail for Macao, where he stayed two months, and next to the Philippines. He then reconnoitered part of the coasts of Japan and the Kuriles and finally reached Kamchatka. It was from there he headed south, passing through the Samoan islands and anchoring in Botany Bay on 26 January 1788. Unfortunately La Pérouse arrived there three days after an English expedi-



tion, commanded by Captain Philip, had taken possession of Australia in the name of the King of England.

In his last mail, addressed from Sydney to the French Admiralty, La Pérouse gave the itinerary which he proposed to follow: he intended to visit Tonga, to explore certain parts of New Caledonia, of the Solomon Islands and of the Louisiade Archipelago, then to pass through the Straits of Torres so as to reach the Isle of France (Mauritius) in December of the same year and to be back at Brest in June 1789. The French Revolution was at its height when in 1791 the National Assembly decided, at the request of the Natural History Society, to send in search of La Pérouse an expedition commanded by the Chevalier d'Entrecasteaux. Misled by information received when passing the Cape, according to which the shipwreck had taken place in the Admiralty Islands, this officer searched in vain for survivors of the Expedition. Crowning misfortune, the two frigates *Recherche* and *Esperance* passed by Vanikoro without calling, d'Entrecasteaux having no reason to think that he might find there survivors from the Expedition. The latter would, moreover, have been most unlikely to have recognized as the national emblem the tricolor, which had, since their departure from Brest, replaced the white flag.

It was not until 1825 that the expedition of Dumont d'Urville was organized; leaving France with very little information he obtained valuable intelligence on arriving in Tasmania. At Hobart he was acquainted with the report of Captain Dillon, an officer of the American Merchant Navy and a well-known personality, who had been sailing the South Seas for some twenty years.

In the course of his voyages across the Pacific, Dillon had one day left on the island of Tikopea, situated about 120 miles to the east of Vanikoro, a Prussian called Bushart and a lascar called Joe, shipwrecked mariners that he had picked up at sea. Passing off this island thirteen years later he decided to call there and then learned from the lascar Joe, who had in his possession a silver sword hilt, the first information that had so far been obtained about the disaster that had befallen La Pérouse.

The lascar had in fact been twice to the island of Vanikoro and he claimed that the wreckage of the two ships was still to be seen on the reefs. He even claimed to have seen on Vanikoro two elderly Europeans who declared themselves to be the survivors of the ill-fated expedition. Dillon immediately decided to visit the spot but inclement weather and adverse currents did not allow him to drop anchor inside the lagoon and he resolved to return to Calcutta. There, on seeing his report, the India Com-

pany put at his disposal a vessel named *Research* and considerable financial resources to enable him to obtain as much information as possible regarding the fate of the French expedition. The Company allocated the sum of 2,000 rupees merely to the purchase of articles which could be distributed to the natives of Vanikoro as presents. This sum was equal to that regarded as adequate to supply a French expedition for a three-year cruise.

More fortunate on this occasion, Dillon succeeded in anchoring inside the reef and obtained, thanks to his largesse, a great quantity of objects coming from La Pérouse's ships, such as pegs, pieces of chain, cooking pots, navigation instruments, four bronze swivel guns, an 18-pounder cannon ball, a Spanish dollar, fragments of porcelain, crockery, bottles and glasses, as well as pieces of lead, copper and iron. He even obtained a carved plank decorated with the fleur-de-lis, which was recognized as having been cast in 1785 in the dockyard at Brest. On his return to Calcutta the India Company authorized Dillon to go to France where he was presented to Charles X, who decorated him with the Cross of Chevalier of the Legion of Honor, a present of 10,000 francs and a pension of 4,000 francs.

In the meantime Dumont d'Urville was trying to find Vanikoro and in order to do this went first to Tikopea where he was told the position of the former isle which Peter Dillon had taken care not to disclose so as not to lose the advantage of his discovery.

Dumont d'Urville had, to begin with, considerable difficulty in getting information from the natives as he had at his disposal much more modest sums of money and as the inhabitants of Vanikoro, who had good reasons for having uneasy consciences, had learned that the newcomers were fellow countrymen of those who had been shipwrecked. Nevertheless, he finally found a guide and it was he who was the first to go to the very place of the shipwreck of *Astrolabe* in the passage facing the village of Ambi (this passage still bears the name of 'False' or 'Wreck Passage' on English maps — 'Passe du Naufrage' in French). Dumont d'Urville then perceived that this opening in the reef was only in appearance a channel since the center of it was filled by a large coral plateau about two to three meters from the surface over which, however, the waves did not break as they did against the reefs on either side:

'Everything gave us to believe,' he said, 'that La Pérouse . . . was heading for Santa Cruz in accordance to his orders. In approaching these islands he no doubt thought to be able to continue on his way during the night, as had often been the case, when he fell unexpectedly upon the terrible reefs of Vanikoro, the existence of which was completely unknown. Probably the frigate which was sailing ahead (the objects

brought back by Dillon lead one to suppose that it was *La Boussole*) struck the shoals without being able to get off while the second ship had time to bear up into the wind and sail towards the open sea.'

However, realizing doubtless that the first ship was irremediably lost, *Astrolabe* endeavored to reach the inside of the reef where it would have been easier to pick up survivors. It was thus in going to the assistance of *La Boussole* that *Astrolabe* met the same fate:

This was, we can have no doubt about it, the cause of the loss of the second vessel. The very appearance of the place where it remains supports this opinion, for at first sight one would think to find there a passage between the reefs. It is, then, possible that the Frenchmen on the second ship tried to go through this opening to the inside of the shoals and that they only realized their mistake when their loss also was assured.

Moreover, Dumont d'Urville's map indicates the exact spot where he discovered and picked up part of the wreckage of *Astrolabe*.

For a long time silence enveloped this unknown and ill-favored island about which the 'Instructions Nautiques' (1948 edition page 331 and following) still say today:

The approach to the island is difficult; the shore is, generally speaking, hidden by mangroves which prevent landing and the fringing reefs go a long way out to sea. There also exists a barrier reef situated in places about 2½ miles from the shore. In the lagoon thus formed there is deep water but numerous coral growths make it dangerous for shipping.

Flies and mosquitoes abound there. The climate is notable for almost continual heat and great humidity. It is unhealthy even for the natives of the island, who are covered in ulcers and often sick. It is deadly for Europeans.

Our hosts at Vanikoro, who were all in excellent health, found the opinion of the Naval Hydrographic Department somewhat exaggerated but this opinion is identical to that expressed by the Hydrographic Department of the British Admiralty.

The same 'Instructions Nautiques' state, regarding the Santa Cruz islands:

The attention of mariners is drawn to the imperfect charting of all the region described in this chapter. In using the charts their confidence in them should be in proportion to the recency of the survey.

They should also bear in mind that the greater part of the information given in this work on anchorages and their approaches has been provided by small vessels with a shallow draught which are very familiar with navigation in coral waters. A larger ship should not, therefore, follow the instructions given herein without taking all the precautions indicated by the circumstances.

As for the natives, who, shouting for joy, helped us to bring up the heavy anchors and pigs of lead, they are described as follows in this mariners' bedside book:

The natives are of excitable nature and often treacherous. One may only put limited trust in them.

The arrival of the first settlers in the New Hebrides and the Solomons, the regular visits of warships, the installation of the missions and, finally, the development of the kauri industry caused a revival of interest in this adventure of the past and searches made on the spot resulted in the discovery of Spanish *reales* or dollars hidden in the ground and of various objects of which the touristic value had quickly been appreciated by the natives of Vanikoro.

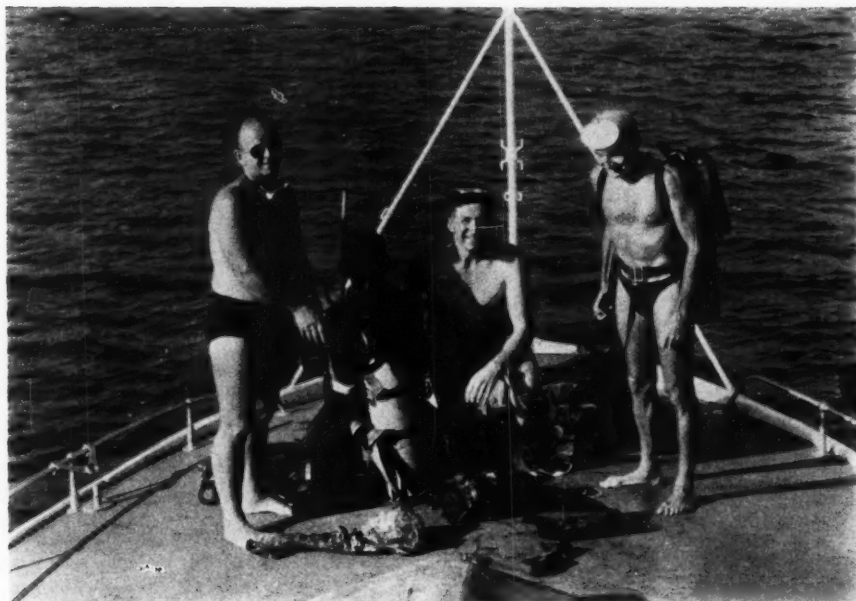
In 1938 a group of three Frenchmen, namely:

- M. Broise, a Master Mariner
- M. Martinet, one of our pioneers in aviation, and
- M. Klein, a settler and trader in the New Hebrides,

went to Vanikoro in a cutter. They spent a month there investigating the various places regarded as likely by the local inhabitants without finding any trace either of *Astrolabe* or *Boussole*. They decided, however, to mark their stay by erecting, on a rock sticking out of the reef to the north of the passage, a cross which is still there and which has been repaired on several occasions by visiting ships of the French Navy. A marble commemorative tablet was placed at the foot of this monument two years ago.

Australian engineers belonging to the Kauri Timber Company, a large firm which cuts kauri on Vanikoro, have continually searched the four places given by the natives as the most probable sites of the shipwreck of the two vessels. A British trader, Mr. Fred Jones, who has spent some thirty-five years on Vanikoro, has carried out searches on his own account and, thanks to his very cordial relations with the natives, has gathered together a certain number of souvenirs thrown up on the coast by the sea or found in the few villages on the island. In 1956 he gave the author a Spanish *real* of 1784 that came from the wreckage.

The last important search was carried out in 1956 by the Patrol Vessel *Tiaré* of the French Navy. Unfortunately the weather prevented a thorough exploration and one of the expedition's two sets of aqualung apparatus was washed overboard by a large wave and could not be recovered.



Members of the expedition on board *Don Quijote*. Left to right: Reece Discombe, Jack Barley, Robert Charles, Pierre Anthonioz



Captain Barley preparing a charge

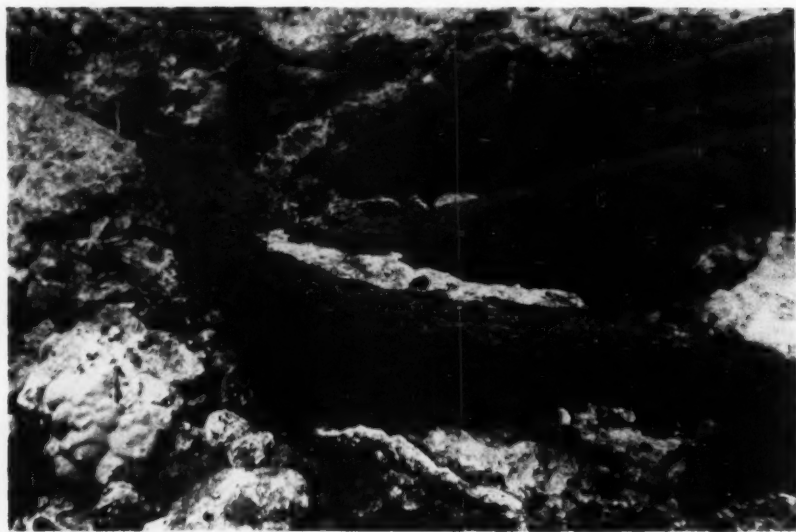


Preparing a charge





Native divers working on the shipwreck



Anchor of *Astrolabe* exposed after the explosion of a charge of dynamite

From all the information that we had been able to obtain it seemed that the first object to be attained was the accumulation of as many sets of diving apparatus as possible, also of a considerable supply of air and, lastly, of explosives and crowbars to enable us to remove the comparatively thick crust of coral which must have grown over the wrecks since 1788, 170 years before.

In November 1957 I had the opportunity of consulting in the Bibliothèque Nationale (Paris) the original maps made in 1828 by Lieutenant Gressien which showed the spot where Dumont d'Urville obtained indisputable proof of the shipwreck of *Astrolabe*, i.e., the plateau of coral reefs situated in the middle and slightly to the south of 'Wreck' or 'Ambi Passage.'

Upon my return we began to organize an expedition which included experts in underwater searches who, although few in number in the New Hebrides, were all highly competent. It was decided to go to Vanikoro on *Don Quijote*, a fast twin-engined motor yacht that was put at our disposal by the Government of the Franco-British Condominium of the New Hebrides. This vessel was commanded by Jack Barley, a British subject who was very well acquainted with navigation in the region of the Solomons, Fiji and the New Hebrides; he had under his orders Mr. Pierre Bouvier, a former leading seaman in the French Navy, who had fought at Guadalcanal and sailed the waters of the New Hebrides and New Caledonia for more than ten years. The two diving specialists were Mr. Robert Charles, a French citizen dwelling at Santo, and Mr. Reece Discombe, a New Zealander living at Vila.

The expedition took with it seven sets of Cousteau diving apparatus, including three sets with two cylinders (BIALU); two sets (S.7) with one cylinder; one set of local manufacture with four cylinders and one 'Narghilé.' We had an air reserve of fifty cubic meters contained in oxygen and acetylene cylinders.

Our departure from Vila took place on 14 March (1958) and we arrived at Santo on the morning of the fifteenth. Having refueled we left on the morning of the sixteenth and on Monday, 17 March, at 7:45 A.M. reached the anchorage of Peu, the headquarters of the Timber Company at Vanikoro. A very warm welcome awaited us from Mr. Hadley, an officer of the Protectorate Forests Department, and his wife, and from Mr. Fylewood, Manager of the Kauri Timber Company, and Mrs. Fylewood.

As the wind was coming from the west we decided to begin our search at once in the passage which was the nearest to Peu, i.e., Bruat Passage.

After having swam around the reefs and across the passage in two places without having seen the least sign of the wreck, we decided to go to the spot which interested us the most, i.e., Wreck Passage. We again swam the length of the reefs and across the passage and finally explored in detail the coral plateau indicated by Dumont d'Urville as being the one from which he obtained pieces of one of the ships.

About one o'clock Messrs. Charles and Discombe suddenly noticed, in about three meters of water, coral possessing an unusual shape and structure and which, according to them, was growing on wood or metal. I must say at once that only a considerable experience in underwater exploration and a long acquaintance with wrecks, upon which the two divers had been working for many years, could have enabled them to distinguish a shape or structure of coral different from the ordinary on this wave-beaten plateau, where the tidal currents are very strong. We decided to begin right away the task of removing the limestone crust with crowbars and after an hour, pieces of wood and lead or scrap iron became visible which undoubtedly belonged to a ship that had foundered a very long time ago. Unfortunately, at about three o'clock, as the tide had turned and was carrying us toward the open sea we were obliged to return to *Don Quijote* and did so with great difficulty, since we were losing ground for half an hour and were finally saved by a line and lifebuoy thrown from the ship.

That evening, Mr. Fylewood, to whom we had described our discovery, offered to put at our disposal on the morrow a very strong raft belonging to the Company, which was used for transporting kauri logs, and the powerful tug *Toby*. These were to enable us to work in much better conditions.

On the morning of the eighteenth, towards eight o'clock, a Lancaster based on Nouméa that the local Commander of the French Fleet Air Arm had kindly diverted to Vanikoro, was heard overhead—unfortunately before we had received confirmation of the agreement of the British authorities in the Solomon Islands Protectorate.<sup>1</sup> We had asked if it would be possible for the aircraft to photograph the passage in order to obtain an over-all view of the wreckage which we could not get so well at water level.

As we had been delayed by the towing of the pontoon, an operation requiring much time, we repaired to the site of the wreck as quickly as possible in order to show the aircraft the buoy left moored the evening before

<sup>1</sup> Seat of the British High Commissioner for the New Hebrides. Both French and British authorities must agree to projects of this nature.

to a cluster of coral rocks. The observer, with whom we were in conversation for a half hour, saw nothing of significance except a group of large sharks moving in the area which we had indicated to him. After having determined with the maximum of precision possible the site of our discovery the aircraft took a film and returned to Santo, experiencing first the breakdown of one motor and then of two others shortly before landing at Luganville (Santo).

Tuesday was spent in blasting with dynamite large pieces of coral, the removal of which uncovered an ever-increasing assortment of wooden or metal objects which seemed to indicate that we had found the bottom of a central hold containing heavy articles.

We found in the course of the day:

Three pigs of lead each weighing 50-60 kgs. and on which were marked the figures 41, 36, etc., a letter A and the following sign:



We also found:

a packet of nails, sheets of cast-iron, copper wire, buttons—doubtless gold ones (unless they were cheap trade articles), and, lastly, fragments of white porcelain.

Towards the end of the day a quite large anchor came to light but the turning of the tide, although occurring later than on the previous day, then obliged us to return to the anchorage.

The search continued on the morning of the nineteenth and we were able to uncover four anchors lying head-to-foot, one on top of the other. One of these was caught in coral growth, eight feet high and over three yards in diameter, to which the raft had been moored. Such was the strength of this coral rock that when the wind blew up in the middle of the day the steel mooring cable of one and one-half inches thickness broke, after having torn away part of the raft, without the 'niggerhead' having as much as trembled.

At the beginning of the afternoon we succeeded in bringing up an anchor with the aid of three 44-gallon drums which had been sunk and then filled with air from an oxygen cylinder.

We finally uncovered, near the end of the third day, a metallic mass resembling a gun three feet in length, banded at both ends, which could have been a small cannon or swivel gun of roughly six-inch caliber. Unfortunately, it was impossible to raise it before the turning of the tide.

Having put on board *Don Quijote* the various articles which we had brought to the surface and stowed on the rear hatch an anchor weighing eleven hundredweight, which appreciably reduced the speed of this 57-foot-long vessel, and after warmly thanking our English and Australian friends from Vanikoro, we sailed at 9 P.M. for the Torres Group, where we spent the twentieth in visiting the islands of Hiu and Tegoa.

We left the Torres at 11 P.M. and arrived at Mota Lava (Banks) at 11 o'clock and finally at Port Olry (Cape Queiros, Santo) at 6 P.M.

On the following day we headed for the Second Channel, Santo, where we arrived at 2 P.M. Leaving there on Sunday night we touched at Atchin (off Malekula) at 6 P.M., at Melsissi (Pentecost) at 3 P.M. and lastly at Siren's Bay, where we spent the night of the twenty-fourth. We left this anchorage at 5 A.M. for Ranputor (South Pentecost), arrived at Olal (Ambrym) at 11 A.M., at Lamen (Epi) at 3 P.M. and finally reached Vila at midnight on the twenty-fifth.

A study of the 1842 edition of a *Voyage Around the World*, published under the direction of Dumont d'Urville, reveals that the discovery is almost certainly genuine.

Although he never visited the site of the shipwreck, Dillon reported the natives' story according to which one of the ships foundered at Vanu and the other at Paiu, but the essential evidence is found in the report made by M. Jacquinet who was instructed by Dumont d'Urville to find the site of the shipwreck. After encountering numerous difficulties with the natives of the island, M. Jacquinet succeeded in getting one of them to accompany him.

The passage describing his arrival at the place of the shipwreck of *Astrolabe* is worth quoting:

The chain of reefs encircling Vanikoro forms a segment of about 2 or 3 miles in front of Paiu and Ambi, in some places coming close to the shore and in others receding to a distance of about one mile and in a kind of channel through the shoals the savage stopped the canoe and pointed to the sea-bottom. The Frenchman looked and saw, here and there, in about 12 or 15 feet of water, anchors, cannons, cannonballs and numerous pieces of lead, all encrusted with coral. This sight dispelled all doubt. On this jagged reef had perished one of the ships of La Pérouse (XVII-2).

But the most important passage is in the next paragraph:

All the wood had been worn away by the waves and only the more durable metal remained. *The way in which the anchors were lying led one to suppose that 4 of them had gone down with the ship whilst the two others could have been dropped.* Moreover, the appearance of the spot made one suspect that the ship had entered this channel in



order to reach the inside of the line of reefs and that it ran aground in it and had not been able to get off. Several savages affirmed that this was the vessel the crew of which had got ashore at Paiu and tried to build a small boat whilst the other ship had struck bottom outside the reef and been completely engulfed.

It is stated that M. Jacquinot and, later on, M. Guilbert succeeded in extracting from the coral an anchor weighing about 1800 pounds without, however, making it clear whether it was one of the four spare anchors or one of the two that had been dropped. He also brought up:

A short iron cannon of 8 calibre, very rusted and encrusted with two inches of coral. A bronze swivel gun, a brass blunderbuss and fragments of porcelain completed this booty salvaged after the passage of 40 years.

It should be added that after a lapse of 170 years the layer of coral has almost quadrupled, to say nothing of the niggerhead to which we moored our craft.

As this document only became available to us after our return from Vanikoro we were unfortunately unable to ascertain if the mausoleum that Dumont d'Urville erected upon a clump of mangroves situated on the reef which partly surrounded the anchorage of Manevai were still to be seen, which is possible if one recalls the evidence of M. Le Goarant who, when visiting Vanikoro in 1828, discovered this monument and noticed that:

Far from destroying the Mausoleum the inhabitants regarded it with a kind of veneration and would be persuaded only with difficulty to allow the newcomer to nail thereupon a medal to mark the passing of the 'Bayonnaise.'

The fact remains that we only brought to light a very small part of the remains of the shipwreck. The wind and tide and the limited means at our disposal did not allow us to do more. But with each new explosion, once the thick black cloud caused by the dynamite had disappeared, we were able to get an idea of the amount of material that remained embedded in the coral, including pieces of blackened wood resembling beech.

We also made a careful search of the reef within 100 yards radius and found in many places objects coming from the ship that had been caught and covered by the growth of the polyparies.

It is highly desirable that the French Admiralty should send to the spot a ship specially equipped for underwater searches, carrying diving and detection apparatus. The ideal would be to use *Calypso* and the Commandant Cousteau and Frederick Dumas team. Doubtless a month or six

weeks' work would be required, depending on the state of the sea, to salvage the most interesting parts of the wreck.

Should the French Government decide to send out such an expedition I think it would be necessary to include Messrs. Charles and Discombe to whom belongs the merit of this discovery, or rather, rediscovery, the first having been forgotten for almost 130 years.

*M. Anthonioz was for some years French Resident Commissioner of the French-British Condominium of the New Hebrides and is, of this date (May 1959) High Commissioner of the République Islamique de Mauritanie, at Saint-Louis, Mauritania, French West Africa—U. C. Duberg.*

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## *The Beginnings of Trade Between the United States and Russia*

BY ALFRED W. CROSBY, JR.

WITH a revivification of the long languishing trade between the United States and Russia not impossible in the near future, perhaps we might re-examine with interest the first foundations of that trade. The facts lie obscure and hidden like ribs of ancient ships lying in the wrack and ooze at the bottom of a harbor, undisturbed by the busy keels passing above.

Russo-American trade began very early and, like so many other branches of our trade, the first page of its history is written on a leaf of Virginia tobacco. In the latter half of the seventeenth century Virginia's tobacco producers found themselves sinking into an economic slough with a modern sounding name: overproduction. In 1681 Governor Thomas Lord Culpeper of the colony wrote moaningly, 'It is commonly said that there is tobacco enough in London now to last all England five years. . . . Our thriving is our undoing. . . .' An expansion of market would solve the problem, of course, but expansion where? Governor Culpeper suggests 'Free importation into Russia would revive our drooping spirits, for we want nothing but a vent.'<sup>1</sup>

Sadly, however, tobacco was forbidden in Muscovy by both the government and the church.<sup>2</sup> The use of tobacco was creeping in, but like most other 'westernisms' it was making little progress among the vast conservative and devout majority. It seemed that Virginia would have to look elsewhere for 'a vent,' unless Muscovy were turned upside down . . . which is exactly what Peter the Great did in the decades around 1700.

Peter had a profound effect on trade between Russia and the West. He encouraged Russians to trade with foreigners. He encouraged production for export. He drove through the Swedes to the sea and gave

<sup>1</sup> J. W. Fortescue (ed.), *Calendar of State Papers, Colonial Series, America and West Indies, 1681-1685* (London: Eyre and Spottiswoode, 1898), p. 156.

<sup>2</sup> *Ibid.*, p. 160.

Russia several good ports on the Baltic. The innovation of Peter's which was most immediately apparent to Americans was his admission—even encouragement of tobacco importation. He had two motives. One was to raise more money for his expanding government, army and new navy. His father had briefly allowed the use of tobacco and had made the tobacco trade a state monopoly. This seemed a good money-making scheme to Peter, especially with the addition of an excise tax on tobacco. The second motive was to encourage the use of tobacco as a small detail of his lifelong campaign to westernize Russia. If westerners shaved, God help the Muscovite whose beard caught the wildly roving eye of the Tsar. And if westerners enjoyed an occasional pipe, then it would be best for all if Peter moved through a constantly replenished haze of smoldering tobacco.<sup>3</sup>

A considerable trade in processed Virginia and Maryland tobacco to Russia came into being in the last twenty years of the seventeenth century.<sup>4</sup> This trade became important enough for Americans to quickly protest to Queen Anne's government in 1705 at the news that Englishmen and English machines were going to Russia to process raw tobacco there. The Americans feared that the Russians, once in possession of the skills to transform tobacco from the raw leaf into a smokable product, would use the nearby Circassian tobacco rather than the American.<sup>5</sup> Queen Anne's government thought enough of the trade to order that all 'Persons whatsoever forbear to send any persons into Muscovy versed in the mystery of spinning and rowling tobacco or any instruments or materials for the same ... as they'd tender her Majesty's displeasure and will answer the contrary at their perils.'<sup>6</sup>

In return for our tobacco and, later in the eighteenth century, our rice, indigo and the tropical goods which we picked up chiefly in the West Indies, Russia sent us some of our most essential imports: iron, sailcloth and other linens, hemp and cordage. These goods were particularly vital to our sailing fleets.

America, following Britain's lead, got much of her quality iron from Russia and Sweden. These two powers on the Baltic had in juxtaposition the two things necessary for the production of strong malleable iron prior to the Industrial Revolution: mines with very rich ores and great

<sup>3</sup> B. H. Sumner, *Peter the Great and the Emergence of Russia* (London: English Universities Press, Ltd., 1950), pp. 45-46.

<sup>4</sup> L. C. Gray, 'The Market Surplus Problems of Colonial Tobacco,' *William and Mary College Quarterly Historical Magazine*, 2d Series, VII (Oct. 1927), 241.

<sup>5</sup> Library of Congress, Manuscript Division, Transcript of British Public Records: Colonial Office 5, Vol. 1314, Part 2, No. 57, dated as received 10 May 1705.

<sup>6</sup> 'Virginia Tobacco in Russia,' *The Virginian Magazine of History and Biography*, IV (July 1896), 57.

forests to provide charcoal for the smelting of those ores.<sup>7</sup> As for sailcloth, Russia was one of the world's greatest sources of the flax from which most sailcloth was made in the eighteenth century, and she also manufactured and exported thousands and thousands of yards of sailcloth herself every year. She was also an important producer of finer linens: ravens-duck, diaper, flems, drillings, etc.<sup>8</sup> Her hemp, however, was her most important export to the world and to America. She was the great source of rope fiber for the whole British Empire, America included. Cables of iron wire would in the 1860's replace rope for bracing American masts, but until that time these nautical steeples under which the peddler sons of Cotton Mather worshipped Mammon stood on straining angles of hemp.<sup>9</sup>

This trade between Russia and colonial America was almost always carried on indirectly. An occasional vessel might travel between the two directly,<sup>10</sup> but the vast majority, whether sailing from a Russian or American port, went to Britain and unloaded there. In Britain the tobacco or hemp would have added to its price the fees of the Englishmen who unloaded it, stored it in their warehouses, sold it, resold it, loaded it on other vessels and sent it on its way. This was the object of England's navigation laws, which obliged the bulk of goods coming into any part of the empire or leaving it to pass through Britain on the way, thus brightening with a bit of gold England's outstretched palms before disappearing into the hands of a colonial or foreigner.

Anyway, a Yankee in need of hemp for his ropewalks, or sails for his bare masts, or linen for his back or his wife's table, rarely wanted to sail directly to Russia. When he did, he usually had to do so as a smuggler, and although he was by no means adverse to a bit of maritime skulking, smuggling all the way to Russia just wasn't worth the effort.<sup>11</sup> When he

<sup>7</sup> *The Dictionary of Merchandise and Nomenclature in All Languages for Use of Counting-Houses* (Philadelphia: James Humphreys, 1805), p. 198; Arthur Cecil Bining, *British Regulation of Colonial Iron Industry* (Philadelphia: University of Pennsylvania Press, 1933), p. 3, 122; Eli F. Heckscher, *An Economic History of Sweden* (Cambridge: Harvard University Press, 1954), p. 177; Francis Wharton (ed.), *The Revolutionary Diplomatic Correspondence of the United States*, V (Washington: Government Printing Office, 1889), 781.

<sup>8</sup> J. Jepson Oddy, *European Commerce* (London, 1805), pp. 80-88; William Tooke, *View of the Russian Empire During the Reign of Catherine the Second* (London, 1799), III, 508; Alex. J. Warden, *The Linen Trade, Ancient and Modern* (London: Longman, Green, Longman, Roberts & Green, 1864), pp. 319, 337.

<sup>9</sup> *American State Papers, Naval Affairs* (Washington: Gales and Seaton, 1860), II, 39; Samuel Eliot Morison, *The Maritime History of Massachusetts, 1783-1860* (Boston: Houghton Mifflin Co., 1921), p. 294; Oddy, *European Commerce*, pp. 80-81.

<sup>10</sup> For instance, a ship under James Thompson of New York, traded at St. Petersburg in 1774, bringing dyewood and rice, and taking away hemp, duck, assorted linens, and a bit of ermine. (Rigsarkivet, Rigsdagsgarden, Copenhagen, Denmark, Sundtoldreg 1774, Luttichau, p. 237r).

<sup>11</sup> Virginia D. Harrington, *The New York Merchant on the Eve of the Revolution* (New York: Columbia University Press, 1935), pp. 166, 198-199.



got there he had little knowledge of the market, nor any connections, nor anyone to give him credit. Moreover, the trade was probably not great enough before our revolution to sustain much direct commerce. To pay the acquisitive English merchant his due, England was the logical entrepôt for trade between America and Russia. A typical Yankee way to get Russian products before the revolution was to ship a cargo of fish to Spain, where good Catholics ate good Protestant fish every Friday, and to remit part of the profits to London to pay for hemp, iron, duck and other Russian goods which had been or were to be shipped to America.<sup>12</sup> Russian goods were typically part of the cargo of any ship arriving from England.<sup>13</sup>

As soon as American farmers and British soldiers exchanged deaths at Lexington and Concord freighting of Russian goods to America in British bottoms came to an end, and the British navy dedicated itself to severing American trade with Russia or anywhere else. It appeared that what little contact we would have with Russia during the war would be with fixed bayonets. In 1775 Catherine the Great seemed inclined to sell the services of some of her troops to George III for use in North America, and although she soon permanently rejected the idea, the rumor that Russian mercenaries were on their way to join the Hessians persisted among Americans.<sup>14</sup>

As it happened, however, Russia's influence on our revolution was much to our advantage. Catherine the Great of Russia, wishing to expand and strengthen neutral rights on the high seas, where Russia was as weak as she was powerful on land, and to take proud Albion down a peg or two, mothered the League of Armed Neutrality in 1780. This League, formed of all the leading neutrals of Europe, obliged Great Britain to accept broader definitions of neutral rights, and thus weakened Britain's blockade against her enemies. This, plus the fact that the very existence of the League informed Britons that even the neutrals were dangerously anglophobic, helped persuade Britain to accept a peace that left the United States independent.<sup>15</sup>

Also, despite the British navy, some trade took place between Russia and the United States during the war, though indirectly. A few Ameri-

<sup>12</sup> Kenneth W. Porter (ed.), *The Jacksons and the Lees, Two Generations of Massachusetts Merchants*, I (Cambridge: Harvard University Press, 1937), 12.

<sup>13</sup> Wharton, *The Revolutionary Diplomatic Correspondence of U. S. V.*, 281, 782.

<sup>14</sup> John C. Fitzpatrick (ed.), *The Writings of George Washington*, X (Washington: Government Printing Office, 1931-1944), n. 82.

<sup>15</sup> Richard B. Morris (ed.), *Encyclopedia of American History* (New York: Harper and Brothers, 1953), pp. 102-103.

can vessels, hagridden by the fear that every sail on the horizon was a British frigate, slipped across the Atlantic to load with Russian goods in Sweden's ports.<sup>16</sup> No American vessels, however, went beyond Sweden to Russia herself.

During the revolution we attempted to open diplomatic relations with Russia. In August of 1781 Francis Dana, commissioned by the Continental Congress to open diplomatic relations with Russia, and his teen-aged secretary, John Quincy Adams, arrived in St. Petersburg, all prepared to woo the Tsarina Catherine.<sup>17</sup> Hadn't Catherine's League of Armed Neutrality indicated that she would accept attentions—perhaps even looked for attentions from our new republic?

Sadly and definitely, no. The United States might glow with coltish ardor, but the experienced Catherine would not even acknowledge the existence of her new admirer. She knew that this act would bring her the enmity of Great Britain and that the nations opposing Great Britain could offer her in return little more than the gratitude of thirteen pseudo-nations half a world away.

Dana spent two long and totally frustrating years in Russia. Never was he ever so much as received by Catherine. But the complete failure of his mission to Russia did not stem from any lack of shrewdness on his part. He was a tutor worthy of John Quincy Adams.

Dana realized that Russia would never recognize the United States for altruistic reasons. He would have to show that it was to her advantage to do so. Being a Yankee, he naturally turned to the possibilities of commerce between Russia and the United States as a solution to his problem. 'I wish this country had a more commercial turn,' he mused. 'We should then soon see a direct communication between the two countries opened and established, to the great benefit of both.'<sup>18</sup>

The sagacity of Dana's lonely theorizing about future Russo-American trade amazes the historian who has the facts of that 'future' before him. Dana knew that there would be an American demand for Russian goods because that demand was already over a hundred years old. The difficulty would be in finding something to exchange for these goods. The Russians were now beginning to raise their own tobacco in the Ukraine,<sup>19</sup> and—anyhow—its importation was at that time prohibited.<sup>20</sup> The only

<sup>16</sup> W. P. Cresson, *Francis Dana, a Puritan Diplomat at the Court of Catherine the Great* (New York: The Dial Press, 1930), p. 244.

<sup>17</sup> Wharton, *Revolutionary Diplomatic Correspondence*, IV, 679.

<sup>18</sup> Wharton, *Revolutionary Diplomatic Correspondence*, V, 117.

<sup>19</sup> Oddy, *European Commerce*, p. 70.

<sup>20</sup> Wharton, *Revolutionary Diplomatic Correspondence*, V, 282.

other native United States products that Russians coveted were rice and indigo, but these would make too slim a base for any great trade. Dana recognized that the backbone of America's colonial commerce, the triangular voyage from the continental colonies to tropical and sub-tropical America and thence to Europe, would also be the backbone of the future trade with Russia. The sugar, coffee, and dyewoods of the West Indies and Latin America would tempt the Russians where the timber, fish and grain of North America would not. '... We must do it by circuitous voyages . . .,'<sup>21</sup> said the Yankee peddler come to the banks of the Neva.

As the spring of 1783 unshackled the Neva and eased the salt ice collars off the pilings of the wharves at Cronstadt and Riga, the war in America was drawing to a close. Yankee ships could now sail the Atlantic without fear of the omnipotent and omnivorous British navy. Francis Dana, not to leave for home until August of that year, confidently awaited the first arrival from the United States.<sup>22</sup>

On 12 June 1783 a ship of 500 tons sailed into the harbor of Riga and dropped anchor. As the current pivoted her around her mooring, the Russians on the waterfront could see clearly the banner that she flew—a strange device of stars and horizontal red and white stripes.

She was a Boston ship come up from Lisbon with a cargo of salt, rice, sugar, chests of fruit and a few hogsheads of brandy. Hers had been a triangular voyage and, excepting the salt and brandy, she came loaded with tropical goods. Her captain, Daniel McNeil, only lately shifted from privateering to trading, grasped the principles of the embryonic Russian trade as well as did Dana.

The name of McNeil's ship is now unknown.<sup>23</sup> Where she went after Riga is also a mystery. She loaded with hemp and sailed off, but *The Boston Gazette* contains no mention of her ever arriving home and the Danish Sound records, though they mention her passage to Russia, do not record that she ever returned.<sup>24</sup> Did she never return to Boston but spend the rest of her existence in other ports and in foreign seas? Did some Danish scribe, heavy-lidded with the boredom of his job, accidentally omit her name from the lists of those who passed west through the

<sup>21</sup> Ibid.

<sup>22</sup> Cresson, *Dana*, p. 317; Wharton, *Revolutionary Diplomatic Correspondence*, VI, 249.

<sup>23</sup> Possibly she was the brigantine *Wasp*, which was issued a letter of marque in Boston on 5 June 1782 and was under the command of Daniel McNeil at that time. Five hundred tons, however, sounds like a few too many for a brigantine. (Library of Congress, *Naval Records of the American Revolution, 1775-1788*, Washington, D. C.: Government Printing Office, 1906), p. 490.

<sup>24</sup> United States National Archives, Papers of the Continental Congress, 89. Letters of J. Jay, F. W. Dana, Vol. II, Francis Dana to Robert Livingston, St. Petersburg, 13 June 1783, O.S.; Rig-sarkivet, Risdagsgarden, Copenhagen, Denmark, Suntolreg 1783, 1. bd. 2, p. 357r.

Sound? Or did a sudden gale drive her onto some rock in the Baltic, and did she slide to the bottom, her sailors cursing the seabirds that lifted from her pitching spars into the safety of the wind?

If the latter melodrama did take place, the ship did nothing so romantic as to sink with all hands. Daniel McNeil survived long after 1783, commanding United States naval vessels in the quasi-war with France of the late 1790's and in the Tripolitan War that followed shortly after. His latter decades he spent on shore and when he died in 1833 he was more noted for shrewd real estate investments than for marine derring-do. At his funeral no one, apparently, rose to eulogize him as the seaman who, fifty years before, had first unfurled the flag of the United States in a Russian port.<sup>25</sup>

McNeil may have commanded the first United States vessel to go to Russia, but he was by no means the first United States citizen to arrive in Russia looking for a chance to turn a dollar. Mr. Jeremiah Allen, a merchant of Boston, arrived in 1783 when the ground was still soggy with melting snow. He disembarked at Riga in May and came up to St. Petersburg in the middle of June,<sup>26</sup> full of initiative, ambition and Yankee acquisitiveness. He apparently had the proper letters of credit and appears to have favorably impressed the proper people, because when the ship *Kingston*, under Captain Norwood, cleared Cronstadt in that year, she was loaded with goods under his name. *Kingston* reached Boston on 20 December 1783, and unloaded a cargo of linens, cables and cordage, hemp and iron.<sup>27</sup>

Jeremiah Allen bought space in *The Boston Gazette* of the following twenty-seventh of January to advertise the goods he had brought back from Russia. (Those interested were invited to come to a location with the simple address, 'the stone house above the chapel.' Ah, how sweetly uncomplicated was Boston then.) At the end of the ad Allen mentioned, with a touch of wholesome pride, that he had friends in St. Petersburg. He offered 'every possible information . . . if any gentleman inclines to send a ship that way. . . .' More than one gentleman would so incline.

The year of 1783 had been one of small beginnings. Only two vessels

<sup>25</sup> Daniel McNeil, *Dictionary of American Biography*, Dumas Malone, ed., XII (New York: Charles Scribner's Sons, 1933), 149-150.

<sup>26</sup> Massachusetts Historical Society, Dana Papers, Francis Dana to Robert Livingston, St. Petersburg, 19 May 1783 O.S.; Papers of Con. Cong., 89, Vol. II, Dana to Livingston, St. Petersburg, 13 June 1783 O.S.

<sup>27</sup> *Boston Gazette*, 22 Dec. 1783, 27 Jan. 1784. Incidentally, *Kingston*, despite the English ring to her name, was registered as of the port of St. Petersburg. She was probably a British vessel operating under a Russian flag, as was common at the time. (Rigsarkivet, Rigsdagsgarden, Copenhagen, Denmark, Sundtörelg 1783, 2. Vol. 2, p. 287, no. 292.)

sailed from St. Petersburg for America,<sup>28</sup> and if any other American vessels than McNeil's arrived in Russia, the information is well hidden from the historian's spade. In 1784 a few more decided to chance the unfamiliar markets and waters of the Baltic. In June three American vessels passed through the Danish Sound on their way to Russia, one from Boston by way of Amsterdam, one from Philadelphia via Cadiz, and one directly from Salem.<sup>29</sup> Their cargoes were typical of those America would be sending to Russia for the next half century: sugar, indigo, rice, dye-wood and, less significantly, a few pipes of wine and hogsheads of rum.<sup>30</sup>

Far behind these three vessels came the bark *Light Horse*, not passing Elsinore on the Danish Sound until the seventeenth of July.<sup>31</sup> Salem, Massachusetts, was her home port and Nehemiah Buffington her captain. She was the property of Elias Hasket Derby, who before his death was to become Salem's and one of America's richest citizens. It isn't known whether Derby discussed plans for this voyage with Jeremiah Allen or not. It is certainly likely that they knew each other. In any case, in mid-June Derby dispatched *Light Horse* out of Salem harbor for St. Petersburg. She was an English-built vessel captured during the Revolution and since bought by Derby. With her cargo of sugar she was worth eight thousand pounds—a pretty hostage to give to the wind and seas and the wiles of St. Petersburg's merchants. She survived the wind and waves with ease, but the intricacies and fluctuations of the market in Russia were too much for her. *Light Horse* returned home with a profitable cargo of hemp, canvas, duck and iron, but the market for sugar in Russia had been limited and she had been obliged to sell her cargo at a loss. Salem marked this voyage as a partially successful and provocative experiment, and probably never noticed that it was the first direct and unbroken voyage by a United States vessel to and from Russia.<sup>32</sup> (Or at least the first we know about.)

Commerce between the United States and Russia had completed its humble and uncertain debut. Merchants—Muscovite and Yankee—had

<sup>28</sup> Timothy Pitkin, *A Statistical View of the Commerce of the United States of America* (New York: James Eastburn and Co., 1817), p. 271.

<sup>29</sup> The latter is probably the ship *Sebastian*, which cleared Salem for St. Petersburg on 17 May 1784. James Duncan Phillips, 'Salem Opens American Trade with Russia,' *New England Quarterly*, XIV (Dec. 1941), 687.

<sup>30</sup> Rigsarkivet, Rigsdagsgarden, Copenhagen, Denmark. Sundtolreg 1784, Nr. 2, 1. bind, p. 248r, 366v.

<sup>31</sup> Essex Institute, Salem, Mass., Derby Mss., Vol. XIII, Letters 1769-1788, N. Fenwick to E. H. Derby, Elsinore, 19 July 1784.

<sup>32</sup> Phillips, 'Salem Opens American Trade with Russia,' *New England Quarterly*, XIV (Dec. 1941), 686.



met, eyed each other's jib and politely sounded the depth of each other's purse. And they had agreed to do business. Wars, depressions, revolutions and great mountainous upheavals of ideology have thrust between them since, but they have yet to renounce that first mercenary handshake.

*Alfred W. Crosby, Jr., was born in Boston, Massachusetts, in 1931. He graduated from Harvard University in 1952 with an A.B. in modern European history, returned in 1955-1956 after three years in the army to earn an A.M.T. from the Harvard School of Education, and received a Ph.D. in United States history from Boston University in June, 1961. His Ph.D. dissertation subject was America, Russia, Hemp and Napoleon: A study of trade between the United States and Russia, 1783-1814.*

*He married Anna F. Bienemann of Baltimore in 1958. Now teaching at Albion College, Michigan, he will be at Ohio State University next year.*



## *The Battle of Campeche*

BY COMMANDER TOM HENDERSON WELLS

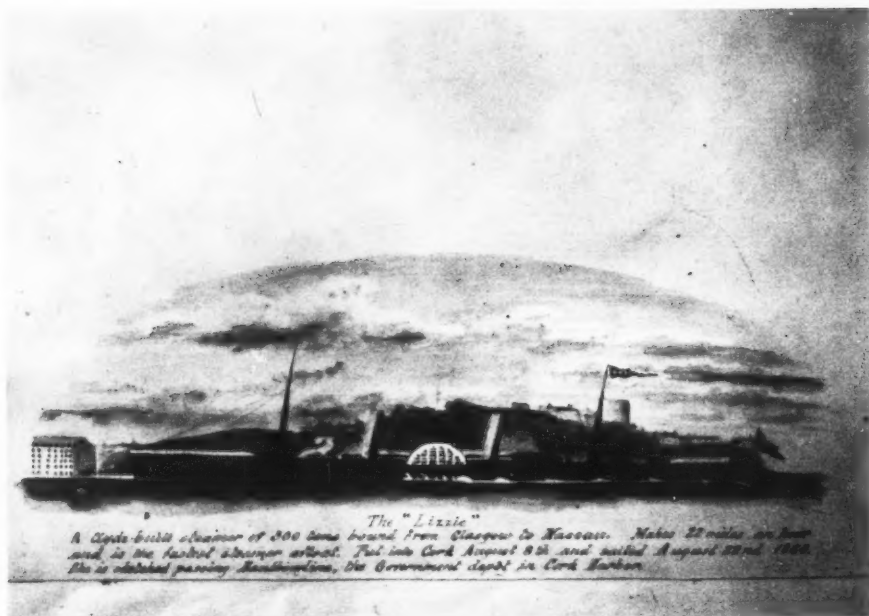
ON 16 May 1843, in the Gulf of Mexico, two small sailing vessels bearing the flag of the Republic of Texas were engaged with the world's two most modern steamships and four sailing vessels in a battle to win from Mexico recognition of the independence of Texas.

This was the first naval engagement in which explosive shells were used, the first action involving an iron steam warship, and the only known victory of sailing vessels over steamers.

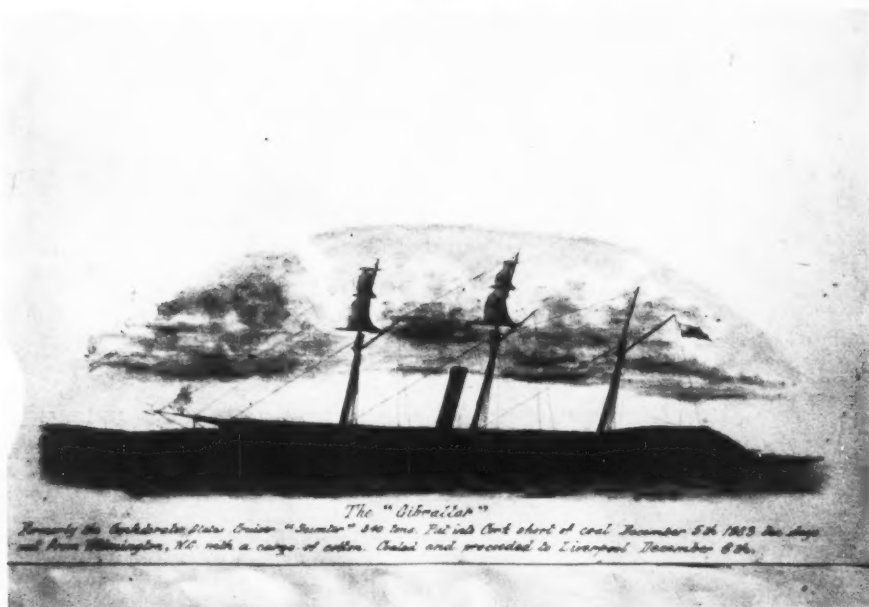
The Texas vessels were the sloop of war *Austin* and the brig *Wharton*, both built in Baltimore in 1839. *Austin* was a very fast, highly maneuverable, full-rigged ship, 125 feet long, 500 tons, carrying sixteen 24-pound and two 18-pound columbiads, and two 18-pound long guns which her commander had borrowed from the Yucatan government. *Wharton* was 110 feet long, 405 tons, with fifteen 18-pound columbiads, and a single long 12-pounder, also borrowed. *Austin* had 146 officers and men; *Wharton* had 86, about three quarters of their proper complements. Almost all the sailors had been aboard less than two months, and three of the older men had recently been convicted of mutiny.

The Texas leader was dynamic, thirty-three-year-old Captain Edwin Ward Moore, the commander in chief of the Texas Navy, and captain of *Austin*. Moore had served fourteen years, mostly on the Gulf of Mexico, as a United States Navy officer, and four in his present capacity. He had left a promising career in the United States to father a new navy for Texas, and to achieve the fame of a Nelson or a Decatur. Of an inventive turn of mind, Commodore Moore had developed and produced, with the help of Dr. Massey of New Orleans, an explosive shell similar to the one General Paixhans had invented in France. Moore was now in Yucatan in defiance of the wishes, though not the orders, of his own president.

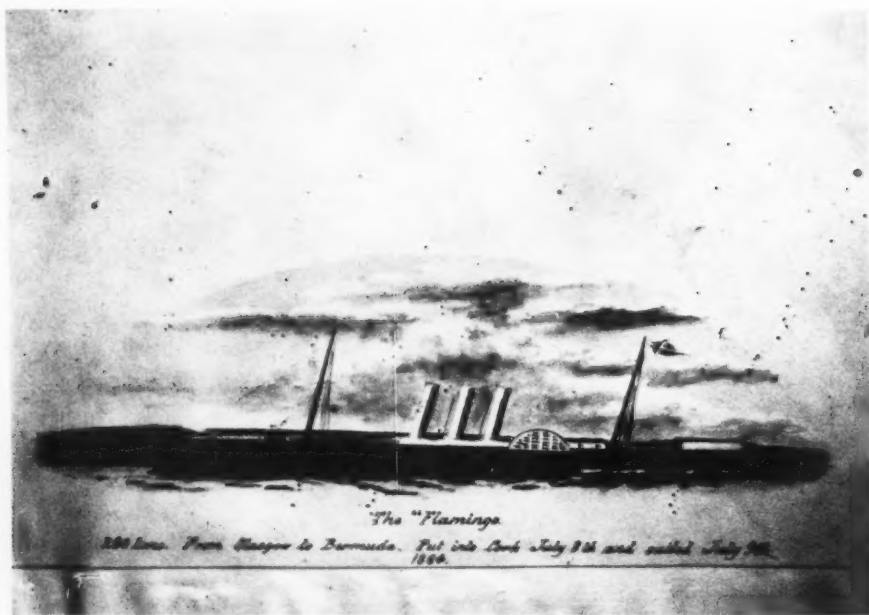
Mexico had bought sailing vessels in the United States, but turned to England for her steamers, which had been built under Admiralty auspices and were completed in 1842. The larger, *Montezuma*, was wooden hulled, 203 feet long, 1,164 tons, with 280-h.p. reciprocating steam en-



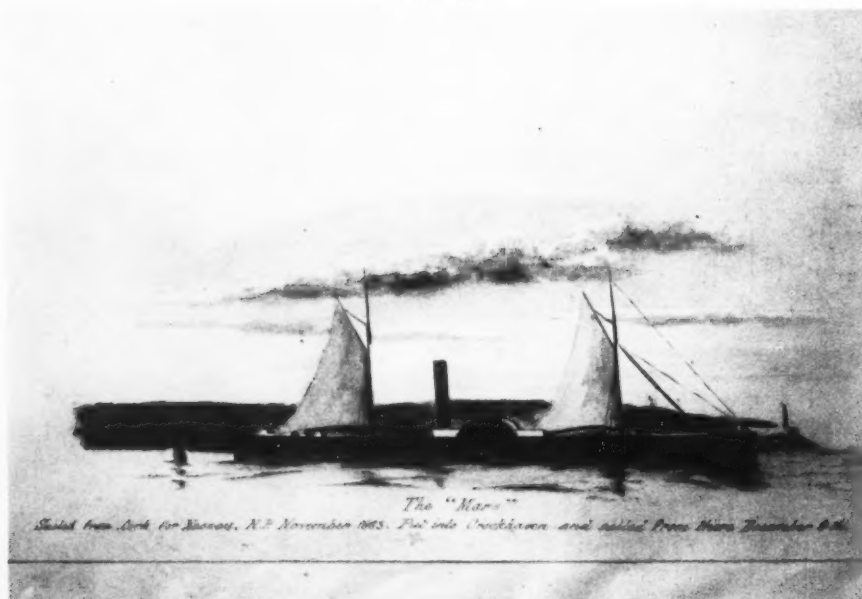
Lizzie



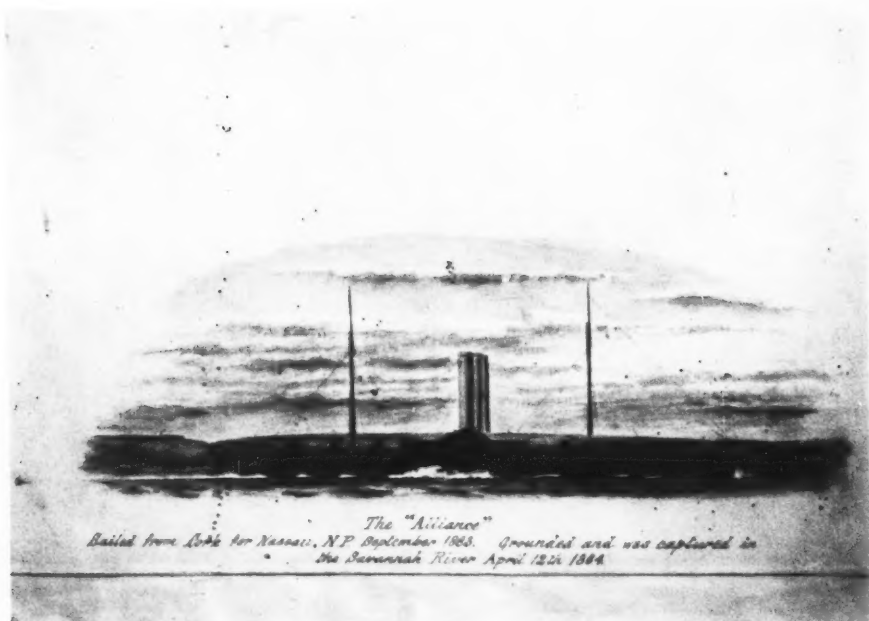
Gibraltar



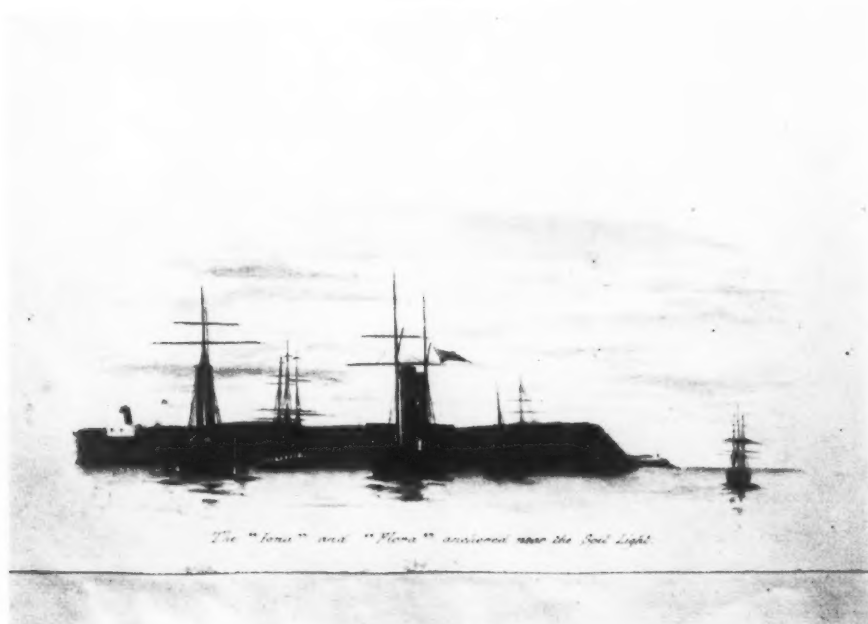
*Flamingo*



*Mars*

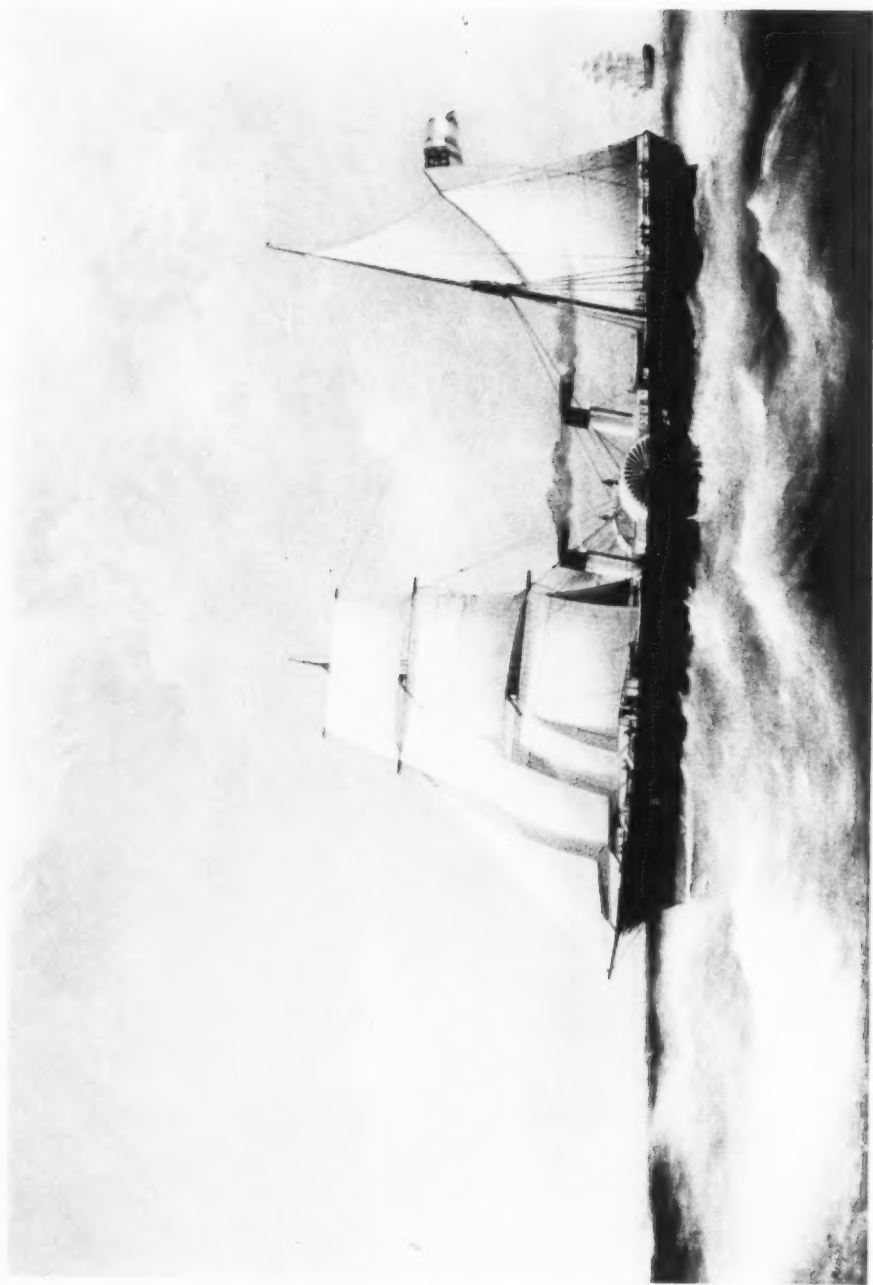


*Alliance*

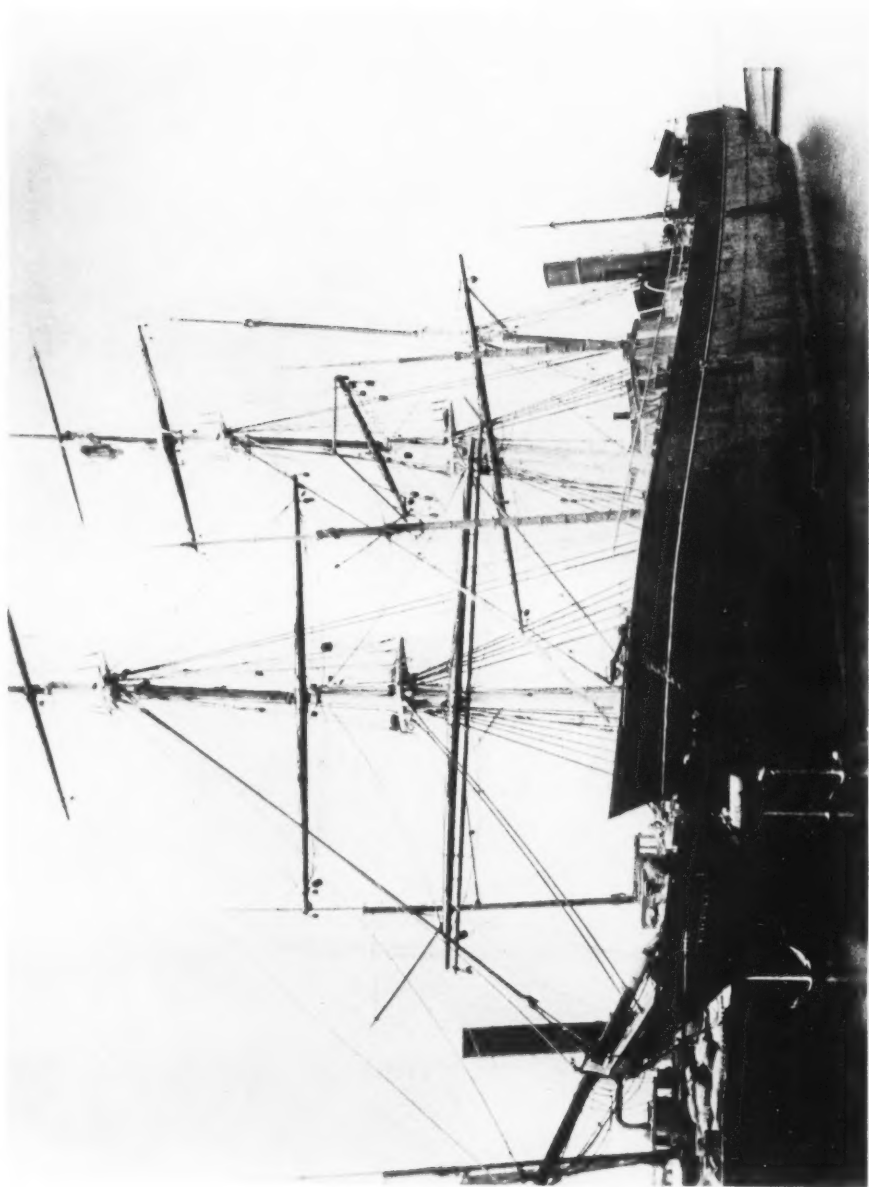


*Iona and Flota*

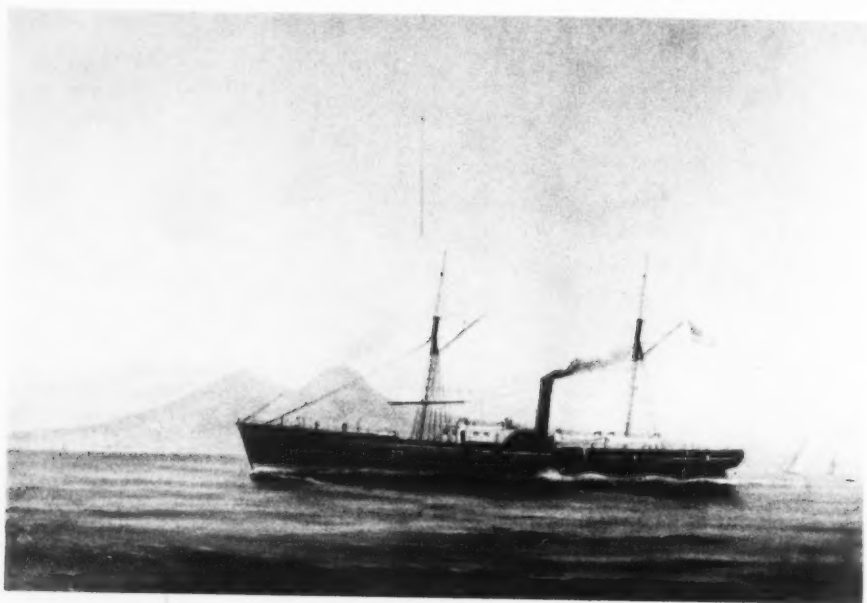




*Pacific*



At right: *Am* captured by USS *Kameacha* 1862



*Margaret and Jessie*



Unidentified

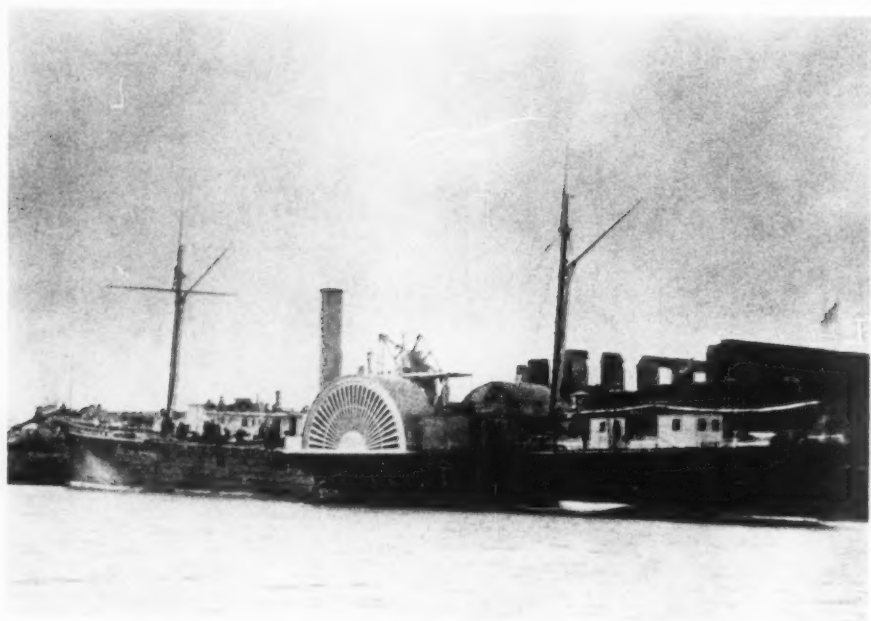
*Courtesy of the Franklin D. Roosevelt Library*



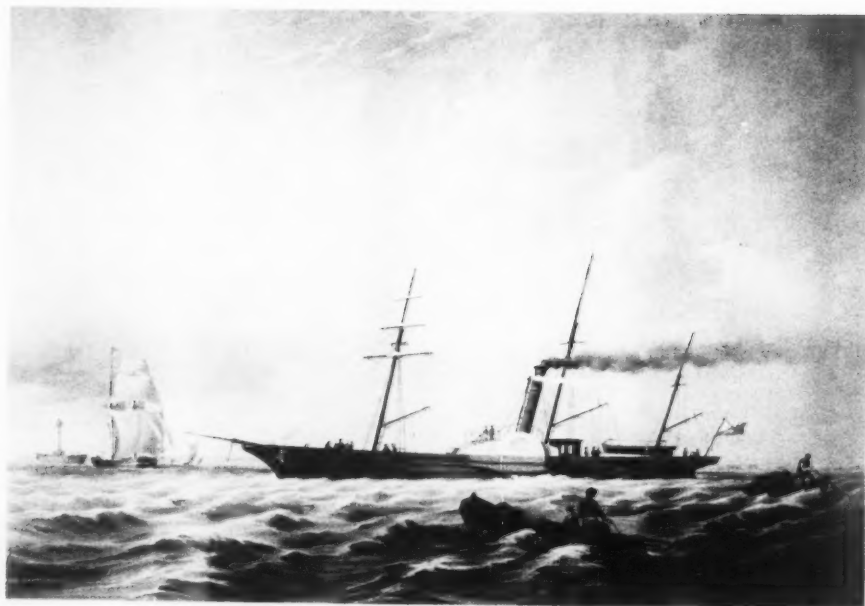
Unidentified



*Teazer*



*Ella and Annie*



*Peterhoff*



gines which drove her side wheels. She mounted two 68-pound swivel Paixhans and six 42-pound long guns.

The smaller was the 183-foot, 788-ton *Guadaloupe*. She was the first iron steam warship in the world, and was compartmented for damage control.<sup>1</sup> She mounted two 68-pound Paixhans and two 32-pound long guns.<sup>2</sup> She had side wheels driven by 180-h.p. steam engines. The steamers alone could discharge fifty per cent greater broadside than the Texans could, and outranged the Texans at least half a mile.

Both of these ships were manned largely by British Navy officers on leave, and by British tars hired at exorbitant rates of pay.<sup>3</sup> Commander Charlewood of *Guadaloupe*, for instance, was supposed to be paid \$450 a month.

Mexican sailing vessels were *Yucateco*, of about *Wharton's* strength. *Eagle*, which mounted seven 42-pound Paixhans, *Iman* nine, and *Campecheano* three.

*Guadaloupe* was the flagship of the Mexican commodore, and was commanded by him after Charlewood resigned in February 1843. *Montezuma* had been commanded by Commander Cleaveland until his death on board of malaria on 30 April. At that time, Commander Araujo of *Eagle* assumed command.

After the Texans broke the Campeche blockade on 30 April 1843, the president appointed competent, aggressive Don Tomás Marín to be squadron commander. Marín had been promoted to captain for his valor and resourcefulness in twice boarding and capturing Yucatan vessels.<sup>4</sup> He was a subordinate of General Ampudia, Mexican commander for subjugation of Yucatan.

Ampudia was prospective commander in chief of the Mexican invasion of Texas which was to bring about its reincorporation into Mexico. A seaborne invasion would avoid the logistic shortages which had reduced Santa Anna's 1836 troops to poor physical condition, and had made subsequent land operations against Texas mere hit-and-run forays. As soon as a troublesome uprising in Yucatan was put down, chartered United States, British, and Spanish vessels, escorted by Marín's victorious squadron, would carry Ampudia's 5,000 to 8,000-man army back up to Texas.

<sup>1</sup> George P. Garrison (ed.), *Diplomatic Correspondence of the Republic of Texas*, II (1), Part II, 983.

<sup>2</sup> *Ibid.*, Part III, 986.

<sup>3</sup> Murphy to Aberdeen, 20 August 1842, F.O. 75/18, 145. Public Record Office, London.

<sup>4</sup> President to Ampudia, 14 May 1843. Secretaría de la Defensa Nacional, Archivo Militar: XI/481. 3/1973. Mexico City.

There, Galveston, Velasco, and Brazoria would fall. Texas would be cut off from supplies and replacements from the United States.

In public, President Sam Houston of Texas favored offensive action against Mexico, but his private policy was to keep Texas weak enough to invite invasion from Mexico; so that the United States would intervene. He abolished the army. By a series of equivocal orders and misappropriations, he made Moore and the Texas Navy appear inept and extravagant. He secured the passage of a Secret Act to dispose of the navy, and sent a commission to New Orleans, where the ships were, in February 1843, to carry it out. Moore was as good a sea lawyer as he was a seaman, and he talked the commissioners into leaving him in command until he could bring the ships to Galveston. One of the commissioners stayed with Moore. When they got to the mouth of the Mississippi, in late April, the captain of a United States merchant ship returning from Yucatan reported the rebellion there just about over, and the Mexicans preparing to redeploy for the long awaited invasion of Texas. Moore and the commissioner decided to go to Galveston by way of Yucatan.<sup>5</sup>

At Campeche, Yucatan, the steamers' great Paixhans were methodically battering down the city's forty-foot stone walls.

At first light on 30 April, Moore's two little sailing vessels burst through the six-ship blockading force, and raised the siege with the loss of only three men. *Guadaloupe* fired Paixhans shells, but only one struck *Austin*, and it did slight damage. This is the first known naval employment of an explosive cannon shell against ships.

The arrival of the Texans heartened the Yucatecos. Each day for the next two weeks Moore got his ships underway from Campeche in the early morning breezes, and tried to entice the Mexicans to battle. Marín kept his steamers between his sailing vessels and the Texans, carefully backing them upwind when *Austin* and *Wharton* approached. It was Moore's aim to close with the Mexicans, but not to let the steamers get between him and Campeche. Marín wanted to keep his steamers upwind of Moore, and to fight at the longest possible range where his long 42's and 32's could outrange Moore's medium 24's and 18's. Apparently, Marín considered his longer-range guns the most valuable of all his advantages over the Texans. So the ships continued several days until Moore borrowed the long 18's and 12. These, although very light, gave Moore the capability of replying to long-range fire. The morning offshore breezes died down each day to be replaced by the onshore breezes which favored

<sup>5</sup> J. Morgan to J. Reed, 11 May 1843. Morgan papers, Rosenberg Library, Galveston.

the Mexicans. On 5 May, Moore wrote, 'If I had a steamer here, I would give ten years of my life, as with it I could get to close action at once and decide the fate of Texas.'<sup>6</sup>

Ampudia had ordered Marín to publish on 16 May a challenge to Moore to come out to fight in deep water, and crammed hundreds of soldiers aboard the Mexican vessels for use as boarders. Moore did not hear of the challenge, but as usual stood out to sea in the early morning breezes. Marín had to accept action.

By midmorning, Moore's sails stood slack. The great Mexican 42's and 32's were skipping shot across the mirror-like sea, gaining an extra mile or more by this technique. They did not hit *Austin* or *Wharton* for a long time, but the two little Texans could neither reply effectively nor maneuver.

Occasionally, the Texans fired their little borrowed 18- or 12-pounders. One shot carried away *Guadaloupe's* ensign. The steamers began working around landward, trying to cut the Texans off from beleaguered Campeche.

Commodore Moore kept his weather eye open, and was ready for wind at 1220 when it came from the seaward. Moore had shifted his yards from port to starboard, and spread every sail he could. *Austin* shot ahead on the first breath of air, right between the two great steamers, both broadsides blazing.

Since *Wharton* had not caught the breeze as quickly, *Austin* took on both steamers and *Eagle* by herself. *Eagle* got one hit on *Austin*, then fled from action to the southward. That left *Austin* alone against the two great steamers, each twice her size with fearsome new explosive shells, high mobility, and in one case, iron hull and compartmentation. All three ships fired steadily as the range decreased. They began firing shell shot. Fusing was primitive, unreliable, and dangerous, as the gunner had to light his fuse before loading the gun. The result was that the air was filled with shells bursting dramatically but harmlessly between ships. One air burst from *Guadaloupe's* 68-pounder did score deeply *Austin's* foretopmast and rip her sails. However, it was the solid shot which did most of the damage to the Texans. Moore reported that one of his 18-pound explosive shells did great damage when it exploded beside *Guadaloupe's* wheelhouse. *Guadaloupe* sent out great billows of smoke and steam, and backed clear on one paddle to make repairs. On *Montezuma*, the dead from her boarding party littered her decks, and she withdrew to windward. *Austin* pursued the two steamers. They fled southward fourteen

<sup>6</sup> *Alexandria Gazette*, 24 May 1843.

miles, punishing *Austin* with fifteen heavy-caliber hits in three hours, but never daring to make a stand and fight it out.<sup>7</sup>

At last, *Austin's* magazine had a hole in the starboard side, and had three feet of water in it. Moore brought his ship about to the port tack to raise the hole out of the water, but found some starboard braces and shrouds gone, and his masts in danger. With very little powder remaining, his rigging and hull shot up, two men killed, twenty-two wounded, and the Mexicans steaming beyond range, Moore reversed course, picked up *Wharton*, and returned to Campeche. *Wharton* lost two men when an excited gun captain fired before his crew was clear of his gun.

*Austin* had fired 530 rounds, almost all her ammunition. *Wharton's* borrowed long 12 alone used sixty-five rounds. Marín had less than two hours' ammunition aboard, and had 151 officers and men killed or wounded. Some Mexican reports were that *Austin* and *Wharton* were taken. A special medal was awarded Marín's sailors for victory over the Texas squadron.

At no time in the action had they been closer than a mile and three quarters. Moore had wanted to get close enough to use large quantities of his shell shot, but the range was so long that he could use only a few.

The battle had tested wooden ships against iron, sail against steam, solid shot against shell. There is no indication of any shells going off after impact. As the Texas commissioner wrote, this action 'broke the charm of the great humbug Paixhans.'

The steam engines had proved themselves reliable. Just one serious breakdown, and Moore would have been in for the kill, but he never got his chance. Even more surprising, numerous hits failed to bring about the boiler explosions which had been predicted. Perhaps *Guadaloupe's* iron construction had given her engines and boilers some protection, and undoubtedly the iron hull had helped reduce the tendency for reciprocating engines to work loose from their mountings.

Moore did his best to cut out one of the Mexican steamers. His headlong tactics were his only possible hope for victory over the steamers.

Marín chose to fight a defensive battle. His ships served him well. Steam had let him pick his range and govern the tactics of the engagement. In view of Marín's reputation for aggressiveness, it is surprising that he did not use the initiative steam gave him, and concentrate his fire. At any rate, he kept Moore at bay.

Both sides claimed the victory, but the advantage lay with the Texans whose sloop and brig had chased the steamers fourteen miles down the

<sup>7</sup> E. W. Moore, *To the People of Texas*, 151.

coast, and kept Campeche open.<sup>8</sup> The invasion did not come off; Texas was not reconquered by Mexico. If Texas had remained independent, Moore would have been her John Paul Jones. But Texas entered the United States three years later, and the exploits of the Texas Navy had no national interest in the United States. Sinope, not Campeche, is recorded as the first naval battle employing explosive shells.

<sup>8</sup> William R. Manning, *Diplomatic Correspondence of the United States*, XII, 290.  
(NOTE: A more complete bibliography can be supplied.)

*Commander Wells is a forty-three-year-old Texan who graduated from the Naval Academy in 1940. After twenty years' service aboard all types of ships, he retired in July to begin a career in writing history. He is the author of Commodore Moore and the Texas Navy, published by the University of Texas Press in October 1960.*



# Documents

## A CABIN INTERIOR

IN 'The Fales Family of Bristol, Rhode Island' by DeC. Fales, pages 208-211, there appears the description of the interior of an English merchant ship which visited Portsmouth, New Hampshire, in 1789. The description gives a far different idea of the interior than one ordinarily pictures. The vessel was owned by Mr. Lewis Fisher, who also was her captain. It is believed the vessel was owned in Bristol, England. The writer of the letter was Miss Charlotte Haliburton, and was addressed to her sister Lucy in Bristol, Rhode Island.

I believe since I have mentioned him I must give you a description of his cabin, for I was on board his ship at an entertainment he gave on my account. He desired me to chuse whom I pleased and he would invite none else. He waited upon me on board a ship that appeared like [a] mountain to me, went down a beautiful staircase with turned banisters, and a carpet on the stairs, went through an entry handsomely painted, papered, and carpet on that, to a very large cabin. I must first begin with the windows, which were four in number, a pair of very large looking-glasses and very fashionable chintz window-curtains festooned with cord and tassel, and white fringe sette of the same kind, mahogany chairs with hair bottoms, mahogany tables, on 2 cases silver-handled knives and forks. The chimney-piece was mahogany, done with gold, with a neat little brass stove and a marble hearth. The doors of his state-room and closet were mahogany, wrought in a variety of figures, and some glass let in. The pictures round the cabin were done with red paint and the prettiest I ever saw. Six silver candlesticks with wax candles were lit in the cabin; tea and coffee and different kinds of nice cakes, silver teapot, coffee-pot, cream-pot and sugar dish. In his stateroom a handsome bureau, a bed with the curtains festooned and fringed, and the prettiest book-case I ever saw, filled with well chosen authors. After tea we danced on the quarter-deck, there was an awning all over it, hung round with lights. We danced till 12 and then sat down to a very elegant supper. And now if you aren't

tired of Captain Fisher's cabin I am, so I will say no more about it.

Contributed by Dean A. Fales, Jr.

## WHALER *Ploughboy*

FRAGMENT of whaler *Ploughboy* owned by the contributor who would like to know where the rest of the log is.

Officers and Crew of the Ship *Ploughboy*  
Sailed from Nantucket Bar on a whaling voyage  
September 26th, 1830

	Nathan Chase—Commander
	William Jay—first Mate—Dis-
Leg cut off	—James H. Briggs—second Mate
	—Leg broke
	Louis Monto—Third Mate
	Henry Coffin—First Boat-
	steerer
Struck by whale	—Orlando Dunney—Second
	Boatsteerer—arm broke
	Thomas S. Mitchell—Cooper
	William S. Arthur—do
Fell from aloft	—Daniel Remsen—Carpenter—
	3 ribs broke
Coqumbo	—William Jones—Black Smith—
	run away
Valparaiso	—Louis Fontignua—Steward—
	run away
" "	Gabriel Thompson—Cook—
	run away
" "	William Hastings—sailor—
	run away
in a gale of wind	—Alexander Whippy—do—Lost
	overboard
swam 3 miles	—Abraham Fareweather—do—
	run away
swam 3 miles	—Silas Fareweather—do—Left
	ashore sick
Sandwich Is.	—David McNiesh—do—run
	away
" " "	—Saml. Smith—do—run away
Scurvey	—John Parmenter—do—2 fin-
	gers cut off
Guam	—Wm. Holding—do—run away
Scurvey	—Charles Smith—do—4 toes cut
	off
Off duty	—H. B. Macy—sailor—1½ years
	sick fever & ague

The *Ploughboy* arrived at Nantucket Bar March 3rd 1834 with Nineteen Hundreds Barrels sperm oil, started home with 2600 Balles. 700 Leakage.

Captured 89 Whales the largest whale Made 125 Barrels Oil. The Crew when settled with were each \$17.00 in debt to the owner.

Contributed by Paul R. Maloney

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## Book Reviews

HOWARD I. CHAPPELLE, *The National Watercraft Collection* (United States National Museum Bulletin 219) (Washington: U. S. Government Printing Office, 1960). 8½" x 11", cloth, XI + 327 pages, illustrated. \$3.50.

The watercraft collection of the Museum of History and Technology of the United States National Museum is of truly outstanding importance, and yet it has been perhaps the least widely known collection of its kind in the country. Its cramped quarters in the venerable Smithsonian Institution have made it difficult to see and study to good advantage. Throughout considerable periods of its existence one suspects that it must have suffered neglect at the hands of custodians whose responsibilities were divided, and whose curiosity in other fields doubtless exceeded their interest in things maritime. Certainly, it reflects no sustained effort to achieve a comprehensive coverage of all aspects of naval architectural development.

The nucleus of the Watercraft Collection is the remarkable group of builders' half-models and rigged models of fishing craft gathered for display at the Centennial Exhibition at Philadelphia, in 1876, and for other such exhibitions which were so popular in this country and in Europe during the ensuing quarter of a century. The excellence of this original material was due largely to the efforts of Captain Joseph William Collins, a Gloucester fisherman, who devoted much of his useful life to the improvement of the design of fishing vessels while in the employ of the U. S. Fish Commission. His was the responsibility for the establishment of the Watercraft Collection, in 1884, and, during his tenure as unofficial curator, he had the foresight to broaden the scope of the collection with an assortment of models of merchant sail and steam vessels solicited from private donors or from various government agencies.

In 1923, Carl W. Mitman prepared the first catalogue of the Watercraft Collection. This useful publication, long out of print and rendered obsolete by recent acquisitions, has been happily superseded by *The National Watercraft Collection*, a most attractive volume written by Howard I. Chapelle, the museum's present Curator of Transportation. Mr. Chapelle is well known to readers of *THE AMERICAN NEPTUNE*, of which he has been one of the editors since its beginning. Through his prolific writings on the history of American naval architecture in the period of sail he has undoubtedly done more than anyone else in recent years to create a popular interest in this field, and it is fortunate that so stimulating a student is in a position to exploit the maritime treasures of the Smithsonian.

This present volume, the first fruit of Chapelle's stewardship, is a fascinating work, far exceeding in scope the basic requirements of a catalogue. Following a brief history of the collection, the author gives a lucid account of the development and use of half-models, and demonstrates their importance as a source for the study of ship design. Those fortunate enough to possess one or more of these models are

likely to be familiar with the perversity of builders and designers in failing to identify them with the names of the craft which were built from them. Then too, many models have been passed on to posterity through the hands of antique dealers, who are prone to obscure all trace of origin by dubbing each a *Frederick Billings* or *Gov. Ames*. When they have escaped this fate identification is often possible by determining the scale and comparing the resulting dimensions with the corresponding data of vessels known to have been built in the yard or locality whence came the model. The author discusses the technique of this intriguing detective work. He also shows the efficient device with which he has been so successful in taking off the lines from half-models.

The Watercraft Collection is treated in three parts: Merchant Sail, Merchant Steam and Fishing Craft. Preceding the description of the models in each of these categories there is an admirable historical introduction which, taken together, amounts to as good a concise history of American naval architecture as is available. The text is augmented by a generous and remarkably interesting selection of photographs and contemporary paintings of nearly every important vessel type.

In his consideration of merchant sail Chapelle argues persuasively that vessels built in the American colonies were not all the apple-bowed, full-bodied craft we had generally imagined. Recent studies of the lines of colonial-built vessels found in the British Admiralty collection indicates that the dangers of war and piracy, and the profits of illicit trade provided sufficient incentive to build fast ships early in the eighteenth century, long before the influence of French design was supposed to have guided our shipbuilders in the art of building speedy craft during Revolutionary times. The obscurity attending the beginnings of the schooner rig is another matter upon which the author sheds light. He suggests that the name 'schooner,' which came into common usage about 1713, was merely a new appellation for the 'catch,' a type of craft frequently mentioned in colonial records prior to that year, but seldom noted thereafter.

Baltimore Clippers, North Atlantic Packets, clipper ships, coasters, ocean freighters and pilot vessels are all dealt with in an authoritative manner. Detailed descriptions are then given of some fifty models representing these diverse types of 'merchant Sail.' Incorporated in these notes is a vast amount of maritime lore: histories of the individual vessels; biographical data about builders and naval architects, and an analysis of each design in language intelligible to the layman. The interest of the volume is enhanced greatly by a profusion of beautifully executed line drawings, although it is to be regretted that these could not have been reproduced in a larger size. There can be no doubt as to the fundamental accuracy of these lines, but in nearly every instance, however, the basic drawings are embellished with billetheads, trailboards, deckhouses and other details which, unless verified by contemporary rigged models, paintings or photographs, must be accepted with caution. A note with each drawing indicating the extent of such reconstruction would be welcome.

One of the few major omissions is the lack of any drawings of the big 'Down Easters' of the 1870's and 1880's, although the museum is provided with models of good examples of the class. In the choice of illustrations, also, the 'Down Easters' fare badly. *William Lawrence* or *W. D. Lawrence*, to give her her correct name, was the largest of the Nova Scotian full-riggers. There was perhaps nothing to distinguish

her in appearance from a New England ship of 1874, but certainly there is no dearth of suitable photographs of Bath-built vessels which would have been more suitable. A second picture is purported to show an unknown 'Down Easter' in a West Coast drydock about 1885. This reviewer has seen a very large, clear copy of this photograph which had once belonged to Captain Josiah Perkins Cressey, of the famed *Flying Cloud*. It seems not unreasonable to suppose that it depicts a vessel in which Captain Cressey had a more than passing interest. The last vessel he is known to have commanded was the 900-ton extreme clipper *Archer*, which was launched from James M. Hood's yard at Somerset, Massachusetts late in 1852. Cressey made a voyage in *Archer* to Foochow, China in 1865, and she was dry-docked at that port to repair damages incurred through grounding in the Min River. The fine, if not exceptionally sharp, lines of the vessel pictured, and the known presence of a photographer in Foochow in the 1860's lend support to the belief that this unknown 'Down Easter' is, in fact, the clipper *Archer*. The photograph, furthermore, agrees with such significant details as are discernible in the reproduction of a Chinese painting of *Archer* in *American Clipper Ships*, by Howe and Matthews.

Among the few errors which almost inevitably find their way into a book so replete with detail as this, it is unfortunate that some of the 1923 catalogue's faults have been perpetuated. For example, the Belfast, Maine schooner *Fannie A. Gorham* is still noted as the *Fame Gorham*, and she and her sister, *Nellie S. Pickering*, were built in 1880, not 1870.

Merchant steam comprises the smallest segment of the Watercraft Collection with only thirty-nine models listed, and, of this number, fully one-quarter are of small launches or cruisers. Nevertheless, it includes a remarkably interesting coverage of the work of John Fitch, Rumsey, Stevens, Robert Fulton and other pioneers of the steamboat. There are also numerous rigged models of river steamers, half-models of buoy tenders and lightships, and several exhibition models of large passenger liners and cargo vessels. A few errors will be apparent among the descriptions of the more modern vessels. The transpacific liners *Empress of Asia* and *Empress of Russia* were built in 1913 rather than in 1924. *Uruguay*, ex *California*, was built for the International Mercantile Marine Company's Panama Pacific Line several years before the parent company acquired control of the United States Line which is given here as the original owner. Confusion is also noted in the description of the Maritime Commission's C-3 design. These 8,500 horsepower vessels are capable of a service speed of 16 to 17 knots instead of the Liberty Ship speed of 10½ knots which is here ascribed to them.

The geographical and technical diversity of the fisheries led to the development of an extraordinary number of different types of sailing craft. Except for the dwindling numbers of skipjacks which survive in the Maryland oyster industry, virtually all of these types have disappeared since the advent of the gasoline engine. The majority of these types were still in common use in Captain Collins' time. The thoroughness of his work is at once apparent from a perusal of this catalogue, more than half of which is devoted to the commercial fishermen. It is however, surprising, to find so well-known a type as the Friendship sloop missing from the collection.

Of primary interest and particularly well-represented are the New England fishing schooners. Chapelle refutes the tradition that they steadily 'improved in size, speed, and all good qualities as time passed and knowledge increased,' maintaining

instead that 'the schooner developed or receded' in these characteristics 'as the economics of the fisheries required, or as international conditions made necessary.' From the 1880's until the introduction of the auxiliary engine soon after 1900, the requisite conditions existed to produce handsome, able vessels which have perhaps never been equaled in sailing qualities by any craft of similar size. *Fredonia*, from the board of Edward Burgess; Crowninshield's *Rob Roy*; and McManus's big knock-about *Helen B. Thomas*, here illustrated in line or photograph, are a delight to contemplate. Mr. Chapelle has devoted years of study to fishing craft and is at his best when he describes them and probes the intricacies of their design.

One cannot but be impressed by the improved standards of the Government Printing Office's work evidenced by a comparison of this most pleasing volume with the very ordinary format of the Mitman catalogue of thirty-seven years ago. Although the price has increased nearly ninefold for a book of substantially the same number of pages, the new book is still a bargain which must prove irresistible to anyone with the slightest interest in America's maritime heritage.

COMMANDER W. J. LEWIS PARKER, U.S.C.G.

JOHN P. PARKER, *Sails of the Maritimes, the story of the three- and four-masted cargo schooners of Atlantic Canada 1850-1929* (Halifax: The Maritime Museum of Canada, 1960). 7¼" x 9¾", cloth, 226 pp., illus., 4 folding plates. \$5.00. (The first edition of this book is already out of print. A reprint will be issued by the author and inquiries should be directed to Captain John P. Parker, 11 Victoria Street, North Sydney, Nova Scotia.)

Throughout the last six or seven decades during which sailing vessels were of commercial importance the maritime enterprise of the Atlantic coast of Canada was markedly similar to New England's seafaring activity. This was especially true during the 1870's and 1880's when Bluenose full-riggers from Yarmouth and St. John were essentially the same in design as the big 'Down Easters' from the yards of Bath and Thomaston with which they competed on equal terms in many of the deepwater trades. Some years prior to the decline of these large ocean traders the schooners increased in size on both sides of the border, and continued to be built in relatively large numbers until just after the First World War.

The Canadian and American schooners, unlike the square-riggers, were built to meet quite different trade requirements so that their designs tended to diverge to a much greater extent than did the earlier ships. The New England coal trade which was responsible for the development of the great five- and six-masted American schooners was closed to vessels of foreign registry. There was no comparable business open to Maritime Province shipowners, so that the largest Canadian schooners built on the Atlantic coast were rigged with no more than four masts and rarely exceeded 900 net tons. Although these fore-and-afters were built for prosaic trades in which they could not draw the widespread interest which attended the more colorful service of the square-riggers; nevertheless they preserved many of the fine traditions of wooden ships and iron men down to our own day. There are many of us who must have fond memories of the few American coasters and of such Nova



Scotiamen as *T. K. Bentley*, *St. Clair Theriault* and *Minas Prince* which continued in service until 1941. It has long been a matter for regret that their history was not more fully recorded. Fortunately, Captain Parker's fine *Sails of the Maritimes* in large part fills this gap so far as the Canadian part of the story is concerned.

Captain Parker is especially well qualified to have written such a book. From 1936 to 1939, while still a young man, he was master and owner of one of the last of the terns or three-masters, *St. Clair Theriault*. His experiences in this vessel, which are recounted in the first chapter, provide a fascinating introduction, although they cannot be taken as typical of the life in an earlier day when the schooners were newer, better found, and less beset by depressed freights.

During his painstaking research for this book, the author was fortunate in having the counsel of the late Frederick William Wallace whose *Wooden Ships and Iron Men* and *In the Wake of the Wind Ships* are the classic histories of the Canadian square-riggers. The style and arrangement of *Sails of the Maritimes* is patterned closely after these volumes. Year by year, from 1857 to 1926, the schooner output of the shipyards around the coasts of the Maritime Provinces and Newfoundland is recorded with great care. Nearly seven hundred three- and four-masted schooners were built during these years. Very few of them are not mentioned in the text, with such details of their histories as the author has been able to locate. A very useful alphabetical list at the end of the book gives the dimensions, net tonnage, and year and place of building for each vessel. Unfortunately, the vessel names are not given in the index so that it is somewhat difficult to locate textual references.

Most merchant vessels proceed upon their lawful occasions in an unobtrusive manner, and it is generally necessary for disaster to overtake them before they become newsworthy. Although some of these schooners lasted fifteen or twenty years, the average life was distressingly short. Time and again this book records the loss of heavily laden craft returning with salt from Turk's Island or the Mediterranean. Some were posted missing, while for a great many others the tale was one of frost-bitten endurance at the pumps until the worn-out crews were taken off by a passing steamer. Although these accounts of disaster are well written, the brevity of most of them creates a certain monotony in their telling.

In an early chapter, the author discusses briefly the design and building of the schooners, the alternate designs for different trades, the rigging, equipment, the crews and the routine of shipboard life. From time to time, where appropriate, he tells something of the trades for which the schooners were built. Gypsum, lumber and salt fish were the principal export from the Maritimes; American anthracite, Barbados molasses and West Indian or Spanish salt were the homeward cargoes. One wishes, however, that the economics of these trades might have been developed in greater detail. There is but little indication of the important part which Nova Scotian gypsum and lumber carriers played during the winter months in the Gulf lumber trade from such ports as Mobile and Pensacola to the West Indies. Again, so important a business as the San Blas coconut trade, for which the smart little tern schooners of A. W. Hendry and other Liverpool, Nova Scotia owners were built, is not mentioned.

There cannot be a single figure of importance in the building, sailing or management of the Canadian Atlantic cargo schooners who is not mentioned by name in

these pages. Many of them must have been interesting personalities, but through the years they have been forgotten, and *Sails of the Maritimes* seems to have been written too late to revivify their memory.

The book is attractively designed and printed. A most generous selection of photographs of schooners has been included. Modelbuilders will be delighted by Howard I. Chapelle's excellent lines and sail plans of the Shelburne tern schooners *Flower Dew*, of 1918, and *Nellie T. Walters*, of 1920. These are reproduced on folding plates of unusually ample size.

The Maritime Museum of Canada, under whose auspices *Sails of the Maritimes* was published, is to be congratulated on the successful production of such a worthwhile book. It is to be hoped that many more such studies of Canada's rich maritime history will appear under their imprint.

COMMANDER W. J. LEWIS PARKER, U.S.C.G.

CLAGETTE BLAKE, *Charles Elliot R.N. 1801-1875, A Servant of Britain Overseas* (London: Cleaver-Hume Press Ltd., 1960). 7" x 10", cloth, xv, 130 pages, illustrations. 25 shillings.

The greater part of this carefully documented and handsomely produced life of Admiral Sir Charles Elliot will be of especial interest to NEPTUNE readers because of Sir Charles' service as Senior Superintendent of the Trade of British Subjects in China from 1836 to 1841. This period included the Opium War. While the name of Captain Charles Elliot turns up frequently in the letters and journals of American merchants and shipmasters at Canton and Macao, the captain played yet another part in American history. Following his duty in China, he spent the next four years as British chargé d'affaires to the Republic of Texas, striving to make it a slave-free state under strong British influence.

Born in Dresden in 1801, where his Scottish father was stationed as British diplomatic representative, Charles Elliot entered the Navy at fourteen. He was a midshipman during Admiral Lord Exmouth's attack on Algiers (represented in Robert Salmon's gigantic canvas in East India Marine Hall at the Peabody Museum), and later served in the Persian Gulf and the West African coast. Promoted to captain at the age of twenty-seven he was placed on half pay. The rest of his life was spent in the service of the Colonial or Foreign Offices. From 1828 he was Protector of Slaves to British Guiana until 1833 when he was first sent to China. Elliot's life after leaving Texas was one of gilded exile as Governor of Bermuda, then of Trinidad, and finally of St. Helena. In due course, he was knighted, and in 1865 promoted to Admiral. In 1869 he returned to England, where he died in 1875. Only the last six of his seventy-four years were spent at home, while, as his biographer indicates, he reached the summit of his career during his late thirties in China.

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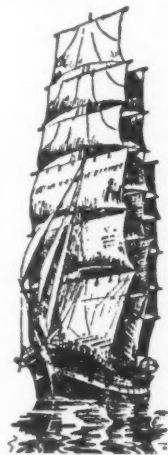
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